THE PENNY MAGAZINE OF THE SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE.



New Series.

1844.

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THE PENNY MAGAZINE

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[*a*, Pontia Cardamines; *b*, Pieris Cratægi; *c*, Pontia Rapæ, *d*, Pontia Napi, *e*, Pontia Brassicæ; *f*, Gonopteryx Rhamni; *g*, Colias Hyale.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

Butterflies.

If, having never seen or heard of a butterfly, one were to meet our gaze, as on winnowing wings it danced through the summer air from flower to flower, should we conceive it possible that it had ever been a crawling and voracious worm, and then a torpid being enveloped like a mummy in a case,—whence it sprung forth in newness of life, light-winged, and graceful in every movement, and arrayed with beauty? And though we know this to be the fact, when we look at the sluggish leaf-eating caterpillar, and contrast it with what it will be, when on broad wings it traverses garden and meadow, extracting from the flowers their nectar for food, we feel involuntary emotions of wonder, so striking is the contrast. Well might the Greeks, elegant even in their mythology, apply the term Psyche to the soul—and to the butterfly, the latter being the mystical emblem of the former.

All know what a caterpillar is,—there are few who are not familiar with the caterpillars of many of the more common butterflies, so destructive to the esculent vegetables of the kitchen-garden; but still some points in their structure and economy may not be so generally understood.

The caterpillars of the butterfly tribe have hard horny jaws; a body consisting of segments, to the number of twelve, exclusive of the head. They are furnished with legs of two kinds: of these, the first three pairs, attached to the three first segments of the body respectively, are *true*, or persistent, being the rudiments of the legs of the perfect insect; these are

horny. The other legs, termed pro-legs, or temporary legs, are soft, short, and conical; they vary in number in different species; the larva or caterpillar of the common cabbage butterfly has five pairs: these feet are furnished with a set of minute, slender, horny hooks, alternately longer and shorter, by means of which the animal is enabled to lay a very firm hold on the leaves of plants or other objects, and also to move along with tolerable dispatch. It is to be observed, that when five pairs of these limbs are present, none are found on the fourth, fifth, tenth, or eleventh segments, but a pair respectively on the sixth, seventh, eighth, ninth, and twelfth segments. In some caterpillars there are only two pairs of these limbs—one pair on the last segment, one on the ninth; such are the geometrical larvæ.

Many caterpillars are covered with long stiff hairs, others with short harsh fur or bristles; some are furnished with tufts; other are naked.

A very important organ possessed by the larvæ of butterflies and moths is the spinneret for the production of silken threads, by means of which some merely suspend themselves during the pupa stage, while others envelop themselves as in a shroud. Many caterpillars, moreover, weave tents of network or houses for themselves in hawthorn, apple, and pear trees, in which, on returning from their foraging excursions, they cluster by hundreds. The spinneret is seated beneath the horny lower lip, or labium, as entomologists term it, and the two first legs; and appears in the form of a conical protuberance, whence two long tortuous tubes extend down the body of the larva: these tubes separate the silk from the juices of the body in the form of a gummy fluid, which, as it is drawn through the aperture of the spinneret, hardens into a thread: such is the silk of the silkworm.

On its exclusion from the egg the caterpillar is of very small size; its growth, however, soon commences, and is as rapid as its appetite is voracious. As, however, it is clothed in an outer skin which is not extensible, this investment, like the armour of the lobster, must be repeatedly changed. Beneath the old outer skin, or epidermis, which soon begins to be loosened, a new one is formed; a rent takes place, from the swelling out of the animal, down the back of the old skin, and this rent gradually increases, till the animal, with a brighter epidermis, frees itself from its discarded weeds, and appears of larger dimensions. During this process, which is often repeated, the caterpillar is sluggish and inactive, and refuses food; but when the process is over, it recovers its former voracity. During all this time the caterpillar is laying up an accumulation of fat to serve the wants of the system during the time of its torpid pupa state, which it is now preparing for. Beneath the last cuticle assumed, the vital energies of the system have developed wings, antennæ, a slender proboscis, and all the parts of the perfect butterfly, or moth, that is to be. This last cuticle, or epidermis, is, however, yet to be cast off, and another is formed to clothe the pupa (or chrysalis, as the pupa of the butterfly is often termed), which in its turn is to be broken open for the exit of the perfect insect. Previously, however, to the pupa stage being assumed, it secures itself by means of its silk in a position varying according to the species. Suppose it merely suspends itself by the tail: in this case the first care of the caterpillar is to cover the spot to which it is about to suspend itself with successive layers of silken threads, which readily adhere, till at last a little silken cone is produced, into which the caterpillar pushes its hinder pair of pro-legs (those on the last segment), which become entangled, and so fixed, amidst the threads; it then permits itself to hang down with the head lowest. In a short time it begins to bend its back, bringing the head near the attached feet; and, after continuing for some time in this attitude, it straightens itself, and repeats the same action. In about twenty-four hours the outer skin begins to split down the back, and the fissure is enlarged by the swelling and pressure of the chrysalis, till at length the head and lower portion of the suspended being become disengaged, the skin shrivelling up into a bundle surrounding the tail. This, however, has to be thrown off, and at the same time the chrysalis has to avoid disengaging itself from its mooring of silken threads from which it hangs: for, be it remembered, it was by its hind-legs that it attached itself. To effect this, instinct-guided, it seizes on a portion of this shrivelled skin between two segments of its body, holding it as with a pair of pincers, and thus, destitute of limbs, supports itself, till it withdraws the tail from the old useless skin which sheathed it: it then, still clinging, elongates the rings of its tail as much as possible, and seizes a higher portion of the skin, and in this manner, climbing backwards as it were upon its exuviæ, it repeats the manœuvre till the extremity of the tail presses the silk, to which it immediately adheres by means of a number of hooks provided for the purpose. Still these exuviæ encumber it, and hang in contact with it; curving its tail in such a manner as partly to embrace the shrivelled skin, it whirls rapidly round, jerking violently, and at length succeeds in disengaging it from its fastenings and throwing it to the ground. Other caterpillars attach themselves closely to the wall or other object by bands of silk round the body, as well as by a little cone of silk at their extremity; and some envelop themselves completely. In a short time the chrysalis hardens (for at first it is very soft), and shows through the outer case the wings, antennæ, eyes, and legs of the perfect insect. It now passes into a sort of torpid state, till the time arrives for the exit of the perfect butterfly from its case.

The duration of the pupa or chrysalis stage of existence varies in different species, and even in the same, being retarded by cold and abbreviated by warmth—a wise provision, as it respects the safety of the matured insect. The butterfly, when ready for exclusion, bursts the skin of the chrysalis, now to be thrown off, which covers the thorax, and emerges, feeble and languid, with wings crumpled up into small bundles. Soon, however, the body acquires strength; the fluids circulate through the nervures of the wings: these gradually unfold, and the creature quivers them, as it feels its growing powers: at length, in the perfection of strength and beauty, it leaves its sordid mummy-case behind,—soars aloft, seeks the flowers of the garden, and commences a new existence.

Such is a sketch of the progress of the caterpillar from the egg to the butterfly; from

> "The worm, a thing that crept
> On the bare earth,—then wrought a tomb and slept,"

to the hovering "Psyche."

The rest of the story is soon told; bright things must fade: the butterfly enjoys a brief summer, deposits its eggs on the plants which instinct teaches it are the appropriate nourishment of the future caterpillar, and passes out of existence.

The group of butterflies before us consists of—*a*, the orange-tip butterfly (Pontia Cardamines); *b*, the black-veined white or hawthorn butterfly (Pieris Crataegi); *c*, the small white butterfly (Pontia Rapæ); *d*, the green-veined white butterfly (Pontia Napi); *e*, the common cabbage butterfly (Pontia Brassicæ); *f*, the brimstone butterfly (Gonopteryx Rhamni); *g*, the pale clouded yellow butterfly (Colias Hyale).

The orange-tip butterfly is tolerably common in our island, frequenting the borders of woods and lanes

winding through a woodland but cultivated district. It usually appears about the end of May; seldom in April. The sexes are very dissimilar. The caterpillar is green, with a white streak along each side: it feeds upon various cruciferous plants, especially those of the genus Cardamine. The large or primary wings of the butterfly are white, dusky at the base, with a small black crescent-mark in the centre, and a black tip. In the male, the outer half of the wing is tinged with orange. In both, the hinder wings are marbled beneath with pale green; above they present faint tracings of the same. Extent of wing averaging an inch and a half. The black-veined white or hawthorn butterfly is very partially distributed in our island, occurring principally in the southern counties: it has been taken in the New Forest, near Chelsea, in Coombe Wood, and in various places in Berkshire. It is by no means uncommon on the Continent. In size it equals the common cabbage butterfly; but the wings are semi-transparent, with black nervures, and a black list round the outer edge. The caterpillars of this species are gregarious, feeding on the leaves of the hawthorn, and weaving a network of silk as a temporary residence, into which they crowd. They are partially hairy, black, and striped with reddish brown on each side.

Pallas once saw such vast flights of this butterfly in the vicinity of Winofka, that he at first mistook them for flakes of snow.

The small white butterfly bears, excepting in size, a close resemblance to the common cabbage species from which, however, it is very distinct, as is proved by their respective caterpillars. It is a very common species, appearing about the beginning of May: a second flight takes place in August. This species is one of the pests of the garden, laying its eggs on cabbages, cauliflowers, &c. The larvæ, or caterpillars, are of a light bluish green, with a pale line above the back, and a whitish streak, somewhat speckled with yellow, along each side of the abdomen. It buries itself deeply between the leaves of the plants, and in the very heart of the cauliflower. The small white butterfly is rather variable in its markings. The colour of the wings above is white, with a slight tinge of yellow; the primary wings have a dusky spot at the tip: and there are two spots in the female—one in the male, in the centre: the hinder wings have a black mark on their anterior border. The anterior wings beneath have two black spots and a yellow tip; the hinder wings beneath are rather of a bright yellow, powdered with black, with a narrow streak of orange-yellow on the anterior edge at the base.

The green-veined white butterfly is extremely common, appearing first in May, a second flight occurring also in July. It frequents gardens, laying its eggs on cabbages and other culinary vegetables. In colouring it is subject to some differences; the general tinge is white inclining to yellow; the tip of the primary wing is dusky, and there are two central black dots in the female, one in the male; a small black dot on the hinder wings near the anterior edge. Under surface of hinder wings and tip of primaries sulphur yellow, the nervures being strongly marked with green; two black spots on the upper wings near the hinder margin. The caterpillar is dull green, paler along the sides, with yellow stigmata, and covered with white warts, which are tufted with short hairs: chrysalis greenish yellow.

The common cabbage butterfly scarcely needs description, so well is it known, as is also its caterpillar, the ravages of which in the kitchen-garden are most annoying. Brocoli, cauliflower, cabbage, turnip, are all infested by it; at the same time it is itself destroyed in abundance by birds which feed upon it or carry it to their young; and it is the favourite victim of a species of ichneumon (Ichneumon glomeratus, Linn.), which by means of a fine ovipositor deposits its eggs within the caterpillar's body, where they soon hatch, the larvæ feeding upon their victim, yet directed by instinct to avoid the vital organs. In due time the caterpillar crawls to some wall, as if about to undergo its pupa stage; but at this period the larvæ of the ichneumon are ready, and gnawing their way out, destroy the miserable being on whose substance they have fed, and, clustering together near the withering body of their supporter, enfold themselves in tiny cocoons of a golden yellow. The walls of our garden bear ample testimony to the parasitic habits of this ichneumon, and to the multitude of caterpillars that perish in the manner described.

The cabbage butterfly appears in April and May: the wings are white above, with a large patch of black on the tip of the anterior pair: in the male, a black spot near the middle of the anterior edge of the secondary wings; the female, besides this, has two others about the middle of the upper wings, and a patch at their hinder margin. The under surface of the wings inclines to yellow, the lower being finely powdered with black: the upper wings have two conspicuous black spots. The caterpillar is green, with a narrow line of yellow along the back, and another on each side of the abdomen; the body is thickly covered with tuberculous points of a black colour, each having a hair in the centre.

The brimstone butterfly is one of the earliest that make their appearance, and may be seen on the wing flitting along the lanes and copses in the month of March, when a bright sunny morning gives hope of the "year confirmed." As the spring advances, it becomes more common, and a second flight comes forth in August. This species is far more abundant in the southern than the northern counties of our island, although in certain localities of the north it is tolerably common. On the Continent it is very generally spread.

The male is of a pure sulphur yellow above, and in both sexes a small spot of orange occupies the centre of each wing. The female is greenish yellow above; the under side is paler than the upper.

The caterpillar is elongated, naked, and of a light green colour, with numerous black scaly dots on the back, and a pale line along each side of the abdomen. It feeds on the buckthorn and the berry-bearing alder, two species of Rhamnus: the chrysalis is short and angular.

The pale clouded yellow butterfly is rare, and found chiefly on the sea-coast in the counties of Kent, Sussex, and Suffolk. A pale variety occurs in the vicinity of Dover. Seldom has it been found far from the sea. It is a fine species: the male is usually of a rich sulphur yellow, the female nearly white: the upper wings are marked near the middle with a black spot, and at their extremity have a deep black border, almost divided by a series of yellow spots into two. The under wings have a large orange spot in the centre: beneath, the upper wings are whitish yellow, orange-stained at the tip, with a black ring-spot enclosing a yellow centre near the middle, and with a row of small dusky marks at some distance from the outer margin. The lower wings beneath are dull orange with a large and a small silvery spot in the centre surrounded with rust-red, and a curved row of small black spots. Fringe of the wings roseate. The caterpillar is green with two white lines on both sides; each segment is marked with two irregular transverse series of black spots. Its food is not precisely ascertained.



[Perugino — The figures from a picture in the Museum at Bologna.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XX.*

PIETRO PERUGINO: 1446—1524.
FRANCESCO FRANCIA: 1450—1517.

THE fame of Perugino rests more on his having been the master and instructor of Raphael, than on his own works or worth. Yet he was a great and remarkable man in his own day: interesting in ours as the representative of a certain school of art immediately preceding that of Raphael. Francesco Francia has left behind him a name perhaps less known and celebrated, but far more revered.

Pietro Vannucci was born at a little town in Umbria, called Citta-della-Pieve, and he was known for the first thirty years of his life as Pietro della Pieve, after he had settled at Perugia, and had obtained there the rights of citizenship, he was called Pietro di Perugia, or IL PERUGINO, by which name he is best known.

The territory of Umbria in Italy comprises that mountainous region of the Ecclesiastical States now called the Duchy of Spoleto. Perugia, Foligno, Assisi, and Spoleto were among its principal towns; and the whole country, with its retired valleys and isolated cities, was distinguished in the middle ages as the peculiar seat of religious enthusiasm. Art, as usual, reflected the habits and feelings of the people, and here Gentile da Fabriano, the beloved friend of Angelico da Fiesole, exercised a particular influence. No less

* By an oversight in the last number of these essays, XVIII was repeated instead of XIX

than thirteen or fourteen Umbrian painters, who flourished between the time of Gentile and that of Raphael, are mentioned in Passavant's 'Life of Raphael.' This mystical and spiritual direction of art extended itself to Bologna, and found a worthy interpreter in Francesco Francia. We shall, however, speak first of Perugino.

We know little of the early life and education of Perugino; his parents were respectable, but poor. His first instructor is supposed to have been Nicolo Alunno. At this time (about 1470) Florence was considered as the head-quarters of art and artists, and the young painter, at the age of five and twenty, undertook a journey to Florence as the most certain path to excellence and fame.

Vasari tells us that Pietro was excited to industry by being constantly told of the great rewards and honours which the professors of painting had earned in ancient and in modern times, and also by the pressure of poverty. He left Perugia in a state of absolute want, and reached Florence, where he pursued his studies for many months with unwearied diligence, but so poor meanwhile that he had not even a bed to sleep on. He studied in the chapel of Masaccio in the Carmine, which has been already mentioned; received some instruction in drawing and modelling from Andrea Verrocchio; and was a friend and fellow-pupil of Leonardo da Vinci. They are thus mentioned together in a contemporary poem written by Giovanni Santi, the father of the great Raphael —

> "Due giovin par d' etate e par d' amori,
> Leonardo da Vinci e 'l Perusino,
> Pier della Pieve, che son divin Pittori."
>
> i. e. "Two youths, equal in years, equal in affection,
> Leonardo da Vinci and the Perugian
> Peter della Pieve, both divine painters."

But though "par d' etate e par d' amori," they certainly were not equal in gifts. Perugino dwindles into insignificance when we think of the triumphant and universal powers of Leonardo: but this is anticipating.

There can be no doubt that Perugino possessed genius and feeling, but of a confined order; it was as if the brightness of his genius kept up a continual struggle with the meanness of his soul, and in the end was overpowered and held down by the growing weakness and debasement; yet when young in his art a pure and gentle feeling guided his pencil; and in the desire to learn, in the fixed determination to improve and to excel, his good sense and his calculating spirit stood him in good stead. There was a famous convent near Florence, in which the monks—not lazy nor ignorant, as monks are usually described—carried on several arts successfully, particularly the art of painting on glass. Perugino was employed to paint some frescoes in their convent, and also to make designs for the glass-painters: in return, he learned how to prepare and to apply many colours not yet in general use; and the lucid and vigorous tints to which his eye became accustomed in their workshop certainly influenced his style of colouring. He gradually rose in estimation; painted a vast number of pictures and frescoes for the churches and chapels of Florence, and particularly an altar-piece of great beauty for the famous convent of Vallombrosa. In this he represented the Assumption of the Virgin, who is soaring to heaven in the midst of a choir of angels, while a company of saints beneath look upwards with adoration and astonishment. This excellent picture is preserved in the Academy of the Fine Arts at Florence, and near it is the portrait of the Abbot of Vallombrosa, by whose order it was painted. Ten years after Perugino had first entered Florence a poor nameless youth, he was called to Rome by Pope Sixtus IV. to assist with most of the distinguished painters of that time in painting the famous Sistine Chapel. All the frescoes of Perugino except two were afterwards effaced to make room for Michael Angelo's Last Judgment. Those which remain show that the style of Perugino at this time was decidedly Florentine, and quite distinct from his earlier and later works. They represent the Baptism of Christ in the river Jordan, and Christ delivering the Keys to St. Peter. While at Rome he also painted a room in the palace of Prince Colonna. When he returned to Perugia he resumed the feeling and manner of his earlier years, combined with better drawing and colouring, and his best pictures were painted between 1490 and 1502; his principal work, however, was the hall of the College *del Cambio* at Perugia, most richly and elaborately painted with frescoes, which still exist. The personages introduced exhibit a strange mixture of the sacred and profane: John the Baptist and other saints, Isaiah, Moses, Daniel, David, and other prophets, are figured on the walls with Fabius Maximus, Socrates, Pythagoras, Pericles, Horatius Cocles, and other Greek



[From the Entombment, in the Pitti Palace.]

and Roman worthies. Other pictures painted in Perugia are remarkable for the simplicity, grace, and dignity of his Virgins, the infantine sweetness of the children and cherubs, and the earnest, ardent expression in the heads of his saints.

Perugino, in the very beginning of the sixteenth century, was certainly the most popular painter of his time; a circumstance which, considering that Raphael, Francia, and Leonardo da Vinci were all working at the same time, would surprise us did we not know that contemporary *popularity* is not generally the recompense of the most distinguished genius: in fact Perugino has produced some of the weakest and worst, as well as some of the most exquisite pictures in the world. He undertook an immense number of works, and employed his scholars and assistants to execute them from his designs. A passion, of which perhaps the seeds were sown in his early days of poverty and misery, had taken possession of his soul. He was no longer excited to labour by a spirit of piety or the generous ambition to excel, but by a base and insatiable thirst for gain: all his late pictures, from the year 1505 to his death, betray the influence of this mean passion. He aimed at nothing beyond mechanical dexterity, and to earn his money with as little expense of time and trouble as possible; he became more and more feeble, mannered, and monotonous, continually repeating the same figures, actions, and heads, till his very admirers were wearied; and on his last visit to Florence, Michael Angelo, who had never done him justice, pronounced him, with contempt, "*Goffo nell' arte*," that is, a mere bungler; for which affront Pietro summoned him before the magistrates, but came off with little honour. He was no longer what he had been. Such was his love of money, or such his mistrust of his family, that when moving from place to place he carried his beloved gold with him; and being on one occasion robbed of a large sum, he fell ill, and was like to die of grief. It seems, however, hardly consistent with the mean and avaricious spirit imputed to him, that having married a beautiful girl of Perugia, he took great delight in seeing her arrayed, at home and abroad, in the most costly garments, and sometimes dressed her with his own hands. To the reproach of avarice—too well founded—some writers have added that of irreligion: nay, two centuries after his death they showed the spot where he was buried in unconsecrated ground under a few trees, near Fontignano, he having refused to receive the last sacraments: this accusation has been refuted; and in truth there is such a divine beauty in some of the best pictures of Perugino, such exquisite purity and tenderness in his Madonnas, such an expression of enthusiastic faith and devotion in some of the heads, that it would be painful to believe that there was no corresponding feeling in his heart. In one or two of his pictures he has reached a degree of sublimity worthy of him who was the master of Raphael, but the instances are few.

In our National Gallery there is a little Madonna and Child by Perugino. The Virgin is seen half-length holding the infant Christ, who is standing in front and grasps in his little hand one of the tresses of her long fair hair; the young St. John is seen half-length on the left, looking up with joined hands. It is an early picture painted before his first residence at Florence, and before he had made his first essays in oil: it is very feeble and finical in the execution, but very sweet and simple in the expression.

In the Louvre at Paris there is a curious allegorical picture by Perugino, representing the Combat of Love and Chastity; many figures in a landscape. It seems a late production—feeble and tasteless; and the subject is precisely one least adapted to the painter's style and powers.

In almost every collection on the Continent there are works of Perugino, for he was so popular in his lifetime, that his pictures were as merchandise, and sold all over Italy. His scholars were very numerous, but the fame of all the rest is swallowed up in that of his great disciple RAPHAEL. Bernardino di Perugia, called PINTURICCHIO, was rather an assistant than a pupil: he has left some excellent works.

Pietro Perugino died in 1524. He survived Raphael four years, and he may be said, during the last twenty-five years of his life, to have survived himself.

ELASTIC CEMENT.

THERE have been within the last few years many attempts made to produce a *glue* or *cement* which shall be more coherent than even woody fibres in their natural state. The subject is a curious one, and shows that our current ideas, respecting the cohesion or strength of wood, require a little modification. However solid a piece of wood may appear to the eye, it is nevertheless a mere bundle of minute fibres and vessels, each one complete and independent in itself, yet all combined into a solid mass. The power which holds them side by side, or in intimate contact, is great; but we are wrong in supposing it greater than that which an artificial cement between two surfaces would exert. If a piece of lead, such as a bullet, be cut in two, and the two cut surfaces be rubbed against each other, they will shortly become so smooth that they will cohere, and each piece will support the other without further assistance. In this case the friction works out all the air from between the surfaces, and smooths down all the asperities, so that the cohesive attraction, which forms one of the mechanical properties of matter, has opportunity to exert itself, and to reunite the severed pieces. The same might, perhaps, be the case with a piece of wood severed into two, were it not that the fibrous nature of the wood prevents the complete expulsion of air, and also prevents the two surfaces from being rubbed to so homogeneous a state as the two surfaces of lead. If, however, a very thin layer of some other substance be introduced, so as to expel air and to adhere to each surface separately, the two surfaces will themselves unite; and it remains to be seen whether or not this artificial joining is as retentive and strong as the natural coherence of the woody fibre.

Such a cement as we here allude to is *glue:* and there has been proof given recently that a glue or cement so used may exceed in cohering power the woody fibres themselves. It is generally from some kind of animal substance that cement for wood is prepared; differing in this respect, as in others, from the cement used for stone.

Before speaking further of the new retentive cement, to which allusion was just made, we will briefly notice the nature and preparation of common glue, the general representatives of this class of cements.

Glue may be obtained from the hides, hoofs, and horns of animals; the ears of oxen, calves, and sheep; the parings of parchment; the refuse scrapings of leather-yards; and indeed from almost any kind of animal matter containing gelatine. However different "calves-foot jelly" and "isinglass" may seem to be from coarse glue, yet they are at one end of the same scale of substances which has glue at the other: they are all varieties more or less pure of gelatine. Although glue can, however, be prepared from a variety of different sources, it is in practice procured almost entirely from the refuse of leather and parchment dressing; for horns and hoofs are more profitably sold by the tanner to others than glue-makers. Of all

the glue made in England, a very large portion is produced at Bermondsey, in the vicinity of the great leather-dressing establishments of that district. In some cases the glue-manufacturer contracts for the purchase of all the scraps and offal resulting from the dressing of leather in one or more establishments; and these contracts exemplify the value which attaches to apparently worthless things, when once they can be brought to rank among the materials of manufactures. Rough and ragged edges of skins, scrapings from skins, and scrapings from parchment, constitute the chief sources whence glue is prepared; and in some cases these refuse fragments—not only useless to the leather-dresser, but a great nuisance if he had to keep them—are worth more than a thousand pounds a year to the owner of one establishment, for sale to the glue-manufacturers.

The extraction of the gelatinous matter from the fragments is effected principally by boiling. The fragments are freed from dirt, blood, and other impurities, by being steeped in lime and water, and then rinsed in a clear stream. In the large glue manufactories there are covered sheds containing stages one above another, each stage containing rails or racks in which the fragments of hide are hung for several months in the year, to dry.

The boiling is effected in shallow vessels, each provided with a false bottom a few inches above the true one, and pierced with holes. Into this boiler the fragments are placed, the false bottom preventing them from being burned by the heat of the fire. Soft water is employed, and the boiling is continued until the water becomes thickened by the gelatine extracted from the fragments. The tenacity of the extract is tested from time to time, by taking out small portions, and allowing them to cool in the open air. When completed, the gelatinous liquid is drawn off into a second vessel, where it is kept in a liquid state for some time by being surrounded with hot water; during which time any sedimentary impurities are deposited; and these impurities, by a further boiling, are made to yield up any gelatine that they may yet retain.

The liquid gelatine is transferred from the settling vessels into cooling boxes, where it assumes the solid form. These boxes, which are made of deal, have a square form, but are somewhat narrower at the bottom than at the top. The liquid is filtered through cloths while passing into the boxes, as a means of cleansing it; and the process is conducted in a dry and cool apartment. In a greater or shorter space of time, varying from twelve to twenty hours, according to the season, the glue solidifies, or at least assumes the consistence of a stiff jelly. The boxes are then taken to a cool and airy apartment, where they are inverted, and the mass of jelly deposited on a moistened table or board. Each of these masses is too thick to harden while in this form, and is therefore cut up into thinner cakes, as a means of letting the air act more readily upon it. This is done somewhat in the way that large masses of soap are cut up in the soap-factories, viz., by means of a wire; the wire is stretched in a frame, and is guided by rollers, so as to cut the masses into parallel slices or cakes, all of equal thickness. The thickness of these cakes may be judged pretty nearly from that of the pieces sold in the shops. The glue-maker then avails himself of a large number of nets spread over frames, and in these frames the cakes of glue are carefully laid. All the frames, as they are filled, are placed in successive stages in the open air, an interval of an inch or two being left between the successive frames in the pile. Any one who has passed along the Greenwich Railway may have seen, at a distance of about a mile from the London Bridge terminus, one or more fields occupied almost wholly by small erections of framework three or four feet in height. These fields are attached to glue-manufactories, and the small erections are piles of drying-frames, each frame filled with slices or cakes of glue exposed to the action of the air, and a roof being over each group to shelter them from the rain. The cakes of glue are turned over two or three times a day, in order that the two sides may be dried equally. Cold, heat, damp, fog, wind, a thunder-storm, indeed any sudden change in the weather, has a very visible effect in the quality of the glue; and the drying becomes therefore one of the most important parts of the manufacture.

Such is the general nature of the production of common glue; and the degree of tenacity which it possesses as a cement for wood is pretty well known. There has, however, within a year or two past, been a kind of cement invented, which although resembling glue in so far as it is a cement for wood, yet differs from it considerably in the mode of formation and the degree of tenacity.

The cement of which we here speak was patented by Mr. Jeffery in 1842. The object of the patent was stated to be "for a new method of preparing masts, spars, and other wood, for ship-building, and other purposes;" the "new method" having relation to the cement with which various pieces of wood are joined together. In the specification of his patent, Mr. Jeffery describes his new cement to be made in the following manner. When a very elastic glue is desired, the patentee dissolves one pound of caoutchouc, or india-rubber, in four gallons of crude naphtha, frequently stirring the solution, until the caoutchouc is well dissolved, which will be in about ten or twelve days. To this mixture is added gum or shell-lac, in the proportion of two parts to one of the naphtha. The composition is then put into an iron vessel, to which heat is applied, the ingredients being well stirred until they have become thoroughly amalgamated. It is then drawn off by means of a tap, on to slabs, where it is allowed to cool: after which it is cut into pieces ready for use. When a less elastic glue is required, it is composed of one part of naphtha to two parts of gum or shell-lac. Previous to using, the glue or cement is heated in an iron pot to the temperature of about two hundred and fifty degrees.

One great object proposed in this invention was to produce a glue which should be at the same time elastic and insoluble in water. To test the strength of the glue, various experiments were made at Woolwich, under the direction of the Board of Ordnance; accounts of which were published in the public journals at the time. One of the experiments instituted was the following:—Two pieces of African teak, a species of wood difficult to be joined together by glue on account of its oily nature, had a coating of the composition applied to them in a boiling state. In a short time afterwards bolts and screws were attached to each end, the joined wood was placed in the testing-frame, and the power of Bramah's hydraulic engine applied. No result was obtained till a pressure of nineteen tons was applied, when the chain broke without the slightest strain being susceptible where the joining took place. A larger chain, of an inch and a half in diameter, was then applied, and was broken with a strain of twenty-one tons, the joint in the wood remaining apparently as firm as at first. Thus showing in both cases that the cement joint was actually more coherent than the iron of the chain.

In another experiment, four pieces of hard wood were joined together, weighing in one piece forty-four hundredweight, and carried to the top of the shears in the dock-yard, a height of seventy-six feet. From this elevation the mass of wood was precipitated on

winded, and so involved as to require great attention to follow. The book is laid down, not again to be taken up, except again by accident, and this is called having read Hudibras. Even the taking it up for a first time is done generally rather in deference to the great arbiters of literary fame, not only of our own, but of foreign nations, than from a liking for the task: a man of any education must not be entirely ignorant of Hudibras. By the great vulgar and the small, from Pepys, who bought the work because he was told it was witty, though he could not find it out, to the devourers of the outpourings of the Minerva Press, Hudibras is quoted and praised, in utter ignorance of its true worth.

But it has not been only by superficial readers that Hudibras has been misconstrued, as at least we humbly presume to think. By his critics and his industrious editor Dr. Zachary Grey it has been unhesitatingly assumed to be a mere attack and bitter satire on the Puritan party, and its author has been blamed or defended for embodying the character of one of his early patrons, Sir Samuel Luke, or Sir Henry Rosewell, in that of Hudibras; and Ralph, and Talgol, and Crowdero, and Trulla, are all traced to supposed individual originals. We believe all the labour thus employed to have been wholly thrown away. Butler's mind was far too large and creative to reduce him to the necessity of borrowing or copying any particular person, nor do any of his characters bear such marks of individuality as to induce us to suppose them drawn from living originals. Any wooden-legged fiddler might have sat for Crowdero, as any 'sporting butcher,' as we should now say, might have stood for Talgol; and even in Sidrophel, who is certainly the best identified as Lilly, there is no personality, nothing unfitting for a counsellor of even the present day nothing but the words or acts that might characterise a class. Butler was no doubt a royalist and a Church-of-England man: in Hudibras and Ralph he has no doubt embodied the Presbyterian and Independent parties; but though his subject was thus rendered local and transitory, the wide grasp of his intellect, the justness and impartiality of his general views, have rendered the satire he applied to them applicable to folly, meanness, selfishness, hypocrisy, concetedness, scholastic pedantry to, in fact, all the worst rank growth of the human mind, through all time and in all situations. It is this that has made him so proverbial. His couplets, with the terseness and sting of epigrams, are found to fit now as well as they did then: but he heaps them one over the other in boundless profusion, while we, his borrowers, find one sufficient for most of our purposes.

Nor is it to be taken for granted that Butler was the indiscriminating satirist of what was then called the Puritan party. It is true that, passing from one extreme to the other, from the pomp and imposing ceremony of the old Roman Catholic church, the Puritans had been gradually approximating to the coldest, barest, and most unimaginative utilitarianism; and Butler felt, like Göthe, that "it is the beautiful which needs encouragement, for all require it, and but few can create it; and he therefore attacked unsparingly these defects of their general character: but he has shown himself by no means unaware of the follies of their opponents, and has dwelt chiefly on those matters of dissent or dispute depending on form or mere metaphysical abstraction, rather than on any of those more material subjects of discussion on which he knew there was abundant room to differ conscientiously.

In a few papers on this great poem we shall endeavour to establish some of these points; whilst the vast variety of allusions to and descriptions of the manners, tastes, customs, and doctrines of the day will afford opportunities of mutually elucidating passages of the poem and the history of the times, while they will be further adorned with pictorial illustrations from the pencil of Harvey and the graver of Jackson. We shall thus, we trust, though our extracts must necessarily be concise, awaken attention to a proper appreciation of the true beauties of this extraordinary poem.

Butler opens his poem with a rapid sketch of the state of society—

"When civil dudgeon first grew high,
And men fell out they knew not why.
* * * * *
And pulpit, drum ecclesiastic,
Was beat with fist instead of a stick;"

proceeds to describe his hero, who embodies characteristics far too multifarious to suit any individual, but exactly fitting the various modifications of the party; —endowing him with wit and scholastic subtlety sufficient to endow a college, yet holding him up to the most unsparing ridicule for their misapplication:

"A wight he was, whose very sight would
Entitle him, Mirth of Knighthood;
That never bow'd his stubborn knee
To any thing but chivalry;
Nor put up blow, but that which laid
Right worshipful on shoulder-blade"

The adoption of aristocratic distinctions, and the sternness and spiritual pride of the party, are here distinctly depicted. Of his mental qualifications, the details occupy one hundred and seventy lines, attributing to him all the pedantic learning, together with its ostentatious display, which characterise the writings of many of the polemical disputants of the time, and which will be noticed on future occasions. Of his personal appearance we must give nearly the whole, in order to introduce him thoroughly to our readers. Having, with the assistance of our engraving, once made an acquaintance with him and his redoubted squire, we can with the greater ease remark upon them intellectual qualities while pursuing their adventures or considering their debates.—

"His tawny beard was th' equal grace
Both of his wisdom and his face;
In cut and dye so like a tile,
A sudden view it would beguile;
The upper part thereof was whey,
The nether orange mix'd with gray.
This hairy meteor did denounce
The fall of sceptres and of crowns.
* * * * *
His back, or rather burthen, show'd,
As if it stoop'd with its own load;
* * * * *
To poise this equally, he bore
A paunch of the same bulk before;
Which still he had a special care
To keep well cramm'd with thrifty fare;
As white-pot, buttermilk, and curds,
Such as a country house affords;
With other victual, which anon
We farther shall dilate upon,
When of his hose we come to treat,
The cupboard where he kept his meat.
"His doublet was of sturdy buff,
And tho' not sword yet cudgel proof;
Whereby 'twas fitter for his use
Who fear'd no blows but such as bruise.
"His breeches were of rugged woollen,
And had been at the siege of Bullen;
To old King Harry, so well known,
Some writers held they were his own.
Tho' they were lin'd with many a piece
Of ammunition bread and cheese,
And fat black puddings, proper food
For warriors that delight in blood.

For, as we said, he always chose
To carry victual in his hose,
That often tempted rats and mice
The ammunition to surprise:
And when he put a hand but in
The one or t'other magazine,
They stoutly in defence on't stood,
And from the wounded toe drew blood;
And 'till th' were storm'd and beaten out,
Ne'er left the fortified redoubt.

* * * *

"His puissant sword unto his side,
Near his undaunted heart was tied;
With basket hilt, that would hold broth,
And serve for fight and dinner both.
In it he melted lead for bullets,
To shoot at foes, and sometimes pullets;
To whom he bore so fell a grutch,
He ne'er gave quarter* any such.
The trenchant blade, Toledo trusty,
For want of fighting was grown rusty,
And ate into itself, for lack
Of somebody to hew and hack.
The peaceful scabbard, where it dwelt,
The rancour of its edge had felt:
For of the lower end two handful
It had devoured, 'twas so manful;
And so much scorn'd to lurk in case,
As if it durst not show its face
In many desperate attempts,
Of warrants, exigents contempts,
It had appear'd with courage bolder
Than Serjeant Bum invading shoulder.
Oft had he ta'en possession,
And prisoners too, or made them run.
"This sword a dagger had, his page,
That was but little for his age.
And therefore waited on him so,
As dwarfs upon knights-errant do.
It was a serviceable dudgeon,
Either for fighting or for drudging.
When it had stabb'd, or broke a head,
It would scrape trenchers, or chip bread;
Toast cheese or bacon, tho' it were
To hait a mouse-trap 'twould not care.
'Twould make clean shoes, and in the earth
Set leeks and onions, and so forth.
It had been prentice to a brewer,
Where this and more it did endure;
But left the trade, as many more
Have lately done on the same score.
"In th' holsters at his saddle-bow
Two aged pistols he did stow,
Among the surplus of such meat
As in his hose he could not get.
These would inveigle rats with th' scent,
To forage when the cocks were bent:
And sometimes catch 'em with a snap,
As cleverly as th' ablest trap.
They were upon hand duty still,
And every night stood centinel,
To guard the magazine i' th' hose
From two-legg'd and from four-legg'd foes.
"Thus clad and fortified, Sir Knight
From peaceful home set forth to fight;
But first, with nimble active force
He got on th' outside of his horse,
For having but one stirrup tied
T' his saddle, on the further side,
It was so short, he had much ado
To reach it with his desperate toe,
And after many strains and heaves,
He got up to the saddle eaves;
From whence he vaulted into th' seat
With so much vigour, strength, and heat,
That he had almost tumbled over
With his own weight, but did recover
By laying hold of tail and mane;
Which oft he used instead of rein.
"But now we talk of mounting steed,
Before we further do proceed,
It doth behove us to say something
Of that which bore our valiant Bumpkin.
The beast was stately, large, and tall,
With mouth of meal and eyes of wall,
I would say eye, for he had but one,
As most agree, though some say none.
He was well stay'd, and in his gait
Preserv'd a grave, magistratic state.
At spur or switch no more he skipt,
Or mended pace, than Spaniard whipt.
And yet so fiery, he would bound
As if he griev'd to touch the ground:
That Cæsar's horse, who, as fame sings,
Had corns upon his feet and toes,
Was not by half so tender hoof'd,
Nor trod upon the ground so soft.
But as that beast would kneel and stoop
(Some write to take his rider up,
So Hudibras his (this well known)
Would often do to set him down.
We shall not need to say what lack
Of leather was upon his back;
For that was hidd'n under pad,
And breech of knight, gall'd full as bad.
His strutting ribs on both sides show'd
Like furrows he himself had plough'd,
For underneath the skirt of pannel,
'Twixt every two there was a channel.
His dangling tail hung in the dirt,
Which on his rider he would flirt,
Still as his tender side he prick'd
With armed heel, or with unarmed heel;
For Hudibras was but one pair

* * * *

"A squire he had whose name was Ralph,
That in th' adventure went his halfe,
Though writers, for more state and pride,
Do call him Ralpho, to ride
And when we can with metre safe,
We'll call him so: if not, plain Ralph,
(For rhyme the rudder is of verses,
With which, like ships, they steer their courses).
An equal stock of wit and valour
He had laid in, by birth a tailor
The mighty Tyrian queen, that gain'd
With subtle shreds a tract of land
Did leave it with a castle fair
To his great ancestor, her heir:
From him descended cross-legged knights,
Fam'd for their faith, and warlike frights
Against the bloody cannibal,
Whom they destroy'd, both great and small.
This stout Squire, he had, as well
As the bold Trojan knight, seen hell,
Not with a counterfeited pass
Of golden bough, but true gold brass.
His knowledge was not far behind
The Knight's, but of another kind,
And he another way came by't;
Some call it gifts, and some new light:
A liberal art that costs no pains
Of study, industry, or brains.
His wit was sent him on a token,
But in the carriage crack'd and broken,
Like commendation nutmegs, crack'd,
With—to and from my love, it look'd."

Practical Philosophy on a small scale.—Many persons may have noticed the great rapidity with which the sacks of malt are raised to the tops of the lofty London brewhouses, and may, without knowing wherefore, have observed that they mount upwards like an arrow, notwithstanding that being drawn from various parts of the waggon, they must often start with a tendency to swing about. This, and all other causes of irregular movement or vibration, are counteracted by the man in the cart, who gives the sack a slight twirl as it leaves his hand, which rolls it as effectually as if it were discharged from a twisted barrel. This is, perhaps, as pretty an example of science applied to humble matters as will easily be met with.—*Gardener's Chronicle.*



[Remains of Caligula's Lighthouse.]

ROMAN LIGHTHOUSE AT BOULOGNE.

BOULOGNE is now perhaps the town in France best known to Englishmen, not even excepting Paris. The facility of intercourse between it and our own shores carries to it so large a number of visitors, that a notice of the more remarkable objects of interest it contains cannot but be acceptable. In Number 426 we gave an account of the Museum, and in Number 612 a notice of the Napoleon Column; but there is yet one circumstance in its ancient history, namely, that of its having been, more than a thousand years since, the chief port for the embarkation of the Romans during their intercourse with our island, and one of the principal places with which the commerce of that period was carried on, that is curious from its showing the similarity of its relation to our own country at so remote a period. In order to ensure as much safety as was practicable in their intercourse, the Romans constructed lighthouses at different points.

"When the poor fishermen of Rutupiæ (Richborough)," says the author of 'Old England,' "steered his oyster-laden bark to Gesoriacum (Boulogne), the pharos of Dover lent its light to make his path across the Channel less perilous and lonely. At Boulogne there was a corresponding lighthouse of Roman work; an octagonal tower, with twelve stages or floors, rising to the height of one hundred and twenty-five feet. This tower is said to have been the work of Caligula: it once stood a bowshot from the sea; but in the course of sixteen centuries the cliff was undermined, and it fell in 1644. The pharos of Dover has had a somewhat longer date, from the nature of its position. No reverence for the past has assisted to preserve what remains of one of the most interesting memorials of that dominion which had such important influences in the civilization of England." The completeness of the destruction may be judged of from the view given, though the incontestable evidences of its former existence and strength yet remain in the massive ruins.

Boulogne was a place of great antiquity: it was in the country of the Morini, a tribe of the Belgæ, and was known to the Romans by the name of Gesoriacum, according to the testimony of Mela, a geographer who flourished in the time of the emperor Claudius. The manner in which Mela speaks of it implies that it was of Gallic origin; and it was in his time the place of greatest note on that coast. Some writers, and among them Montfaucon, Cluverius, Sanson, and Le Quien, have endeavoured to show that Boulogne was also the Portus Itius, from which Julius Cæsar embarked for Britain in his first (according to Strabo) and second expeditions to that island; but their opinion is rejected by D'Anville, who agrees with Du Cange, and with our own antiquary Camden, in fixing the Portus Itius at Witsand or Wissan, a small town near Cap de Griz Nez. Gesoriacum became, under the Romans, the chief port of embarkation for Britain; here, D'Anville thinks, was the tower erected by Caligula, when he marched to the coast of Gaul in order to invade Britain; and the emperor Claudius, according to Suetonius, embarked here for that island. The port in Britain with which a communication was chiefly maintained was Rutupiæ, now Richborough, near Sandwich. About the time of the emperor Constantine, the name of Bononia was substituted for that of Gesoriacum, and the latter is not used by Ammianus Marcellinus, Eutropius, and other writers of a later period. In the Notitia Provinciarum Galliarum, subjoined to the Itinerary of Antoninus, mention is made of the Civitas Bononensium as distinct from the Civitas Morinorum, which indicates that the country of the Morini had been divided between two communities, of one of which Bononia was the capital.

When, in the latter part of the third century, Carausius was proclaimed emperor by the legions in Britain, he possessed himself of Bononia, which appears to have been one of the Roman naval stations, for Carausius, before his revolt, had been directed to fit out from it a fleet to clear the sea of pirates. This town was in consequence besieged by the Cæsar Constantius Chlorus, father of Constantine the Great. The siege, which

ended in the capture of the town, was the occasion of serious detriment to it. In the fifth century Bononia is said to have been unsuccessfully attacked by Attila, king of the Huns; and in the ninth century it was laid waste by the Northmen, who landed just by. From the discovery of a ring to which the cables of vessels were fastened, it is thought that the sea flowed up as far as the present upper town of Boulogne, in which case Gesoriacum must have been at the bottom of a small bay.

Several Roman antiquities have been discovered at Boulogne; among these are medals and tombs. During 1823, 1826, and 1827, several tombs were discovered. Those discovered in 1823 were close to the sea; those discovered in 1826 and 1827 were a little out of the town, on the right of the road to Paris. The coffins in these last-mentioned tombs were ranged in regular order, and the bones (some of which bore the marks of deep wounds) were in good preservation. Several wells, a Roman road, and the foundations of what was considered to be a votive altar, were discovered at the same place; also many vases of different forms, and a great number of medals. Similar discoveries had been made before. On a cliff near the entrance of the port there stood a tower, of which the remains are represented in the cut at the head of our article, from a sketch recently taken, which tower D'Anville considers to be one built by Caligula, as mentioned above. It was an octagon, and each side is said to have been about twenty-four or twenty-five French (equal to twenty-five and a half or twenty-six and a half English) feet (at the base, we presume), and it rose to the height of one hundred and twenty-five feet. It had twelve stages or floors, and the diameter of the tower appears to have diminished three feet at each stage, so as to form so many external galleries of a foot and a half in width, going all round the tower. On the top of the tower lights were placed, so that it served as a lighthouse to vessels navigating the Channel. The tower was built in a manner somewhat similar to that of the Palais des Thermes, a Roman edifice at Paris. It is built with iron grey-stone, three tiers together, succeeded by a double tier of a yellow stone of a softer texture, and on this a double tier of very hard and red bricks. At the time of its erection it stood more than a bowshot from the sea, but the cliff was so much excavated by the waves, and fell in so far, that the tower was at last undermined and overthrown in the year 1644. It had been repaired by Charlemagne in the early part of the ninth century; and when the English were in possession of Boulogne they surrounded this tower with a wall and towers, so as to convert it into a donjon, or keep of a fortress. These walls and towers shared the fate of the original Roman work in being overthrown by the advance of the sea. The tower was named in the middle ages *Turris ordans* (supposed to be a corruption of *ardens*, burning) or *ordensis*; and is still spoken of as the Tour d'Ordre. There were in the middle of the last century some ruins of the Roman walls, built of the same materials as the above-mentioned towers.

ON THE PRODUCTION OF SOUND UNDER WATER.

Experiments of a remarkable kind have at different times been made on the power of *water* to transmit sound, and on the comparison between it and the air as a medium for sound. Under ordinary circumstances, we know but very little of the conveyance of sound under water; our sound-producing instruments and our auditory apparatus being equally exposed to the open air. It would perhaps excite surprise in many to be told that sound can not only be conveyed under water, but that it *travels* faster in that medium than in air; yet such is the case.

The 'Philosophical Transactions' contain many accounts of experiments made with a view to determine the action of water in this respect. Mr. Anderson, about ninety years ago, tried in the first case how far persons under water could hear sounds produced in the air; and in the next place, whether persons above water could hear sounds produced *in* the water. He caused three people to dive at once into water, and remain for a few seconds about two feet below the surface; he then spoke to them as loud as he was able, and on their coming up they said they had heard him, but that his voice sounded very low. He then caused them to dive to a depth of twelve feet below the surface, and fired a gun immediately above the water; on coming up, they said they had heard it, but that the sound was exceedingly faint. The converse of many of these experiments was next tried. A diver contrived to "halloo" under water, and produced a sound which was heard faintly above.

The Abbé Nollet descended to various depths beneath the water, for the purpose of determining whether he could hear the sound of a bell rung above water; the sound was faint, but always audible to him. Franklin, on one occasion, plunged his head below water, and caused a person to strike two stones together beneath the surface; at more than half a mile distance he heard the blows distinctly.

In the year 1826 this subject was experimentally tested in a remarkable manner on the Lake of Geneva, by M. Colladon. One point which he wished to determine was, the duration and quality of sound in water. He found that the sound of a bell struck under water, and heard at some distance, had no resemblance to that of a bell struck in the open air. Instead of a prolonged sound, there is heard under water a short and sharp noise, which M. Colladon says he can compare to nothing better than to that of two knife-blades struck against each other; and on retiring from the bell, the sound always preserves this character, diminishing only in intensity.

M. Colladon provided a curious kind of apparatus for making these investigations. It consisted of a thin tin cylinder about eight or nine feet long, and eight inches in diameter, closed at one end and open at the other. This was plunged into the water, leaving the open end above the surface; and the ear, applied to this end, could hear any sonorous effects which might be the object of examination. With such a contrivance, M. Colladon, applying his ear to the open end of the tube, while the closed end was immersed in the water of the lake of Geneva, could hear the sound of a bell struck under water, when the bell was so far distant as two thousand, six thousand, and in one instance, fourteen thousand metres (about nine miles). This latter distance was across the whole breadth of the lake, from Rolle to Thonon. The spot was particularly well calculated for such an experiment, the water being very deep, without a trace of any current, and of the most transparent purity. The signals were made by the inflammation of gunpowder, which being performed by the same blow of the hammer by which the bell was struck, all loss of time was effectually avoided. The lapse of time, in those experiments whose object was to determine the velocity of sound in water, was reckoned by a quarter-second stop-watch, and was computed from the appearance of the flash to the arrival of the sound.

M. Colladon found that the power of hearing sounds produced in the water, when the head of the listener was out of the water, and no tube employed, depended greatly on whether he was nearly over the spot where the bell was placed. At a distance of two hundred

metres he heard the bell very distinctly, while at four or five hundred metres distance he could not hear the slightest sound, even when the ear was almost close to the water. When, on the contrary, the head was immersed for a few seconds beneath the water, or the hearing-tube was employed, the sound could be heard distinctly at from ten to twenty times this distance. The employment of the tube had a remarkable effect in bringing the sound to the ear of the experimenter. M. Colladon remarks:—"The agitation produced by the waves does not alter the duration nor the velocity of sound, when a tube is used for hearing. The last of the three experiments mentioned above (*i. e.* two thousand, six thousand, and fourteen thousand metres) was made in stormy weather. The wind, which at first was weak, increased to such a degree, that several anchors were necessary to hold the vessel. Notwithstanding the noise of the waves, I could still distinguish pretty well the sound of each stroke, and the duration of its transmission was not altered."

To ascertain the effect of screens or obstacles on the intensity of the sound, M. Colladon chose two stations, at no great distance apart, and so situated that the straight line which joined them grazed the extremity of a thick wall which rose above the level of the water. He then caused a bell to be struck regularly, in the water, with strokes of equal intensity; and on listening to the sound with the tube alternately on either side of the line which grazed the extremity of the wall, he found that there was a marked difference in intensity, according as this extremity was or was not interposed between the bell and the tube—the screen sensibly diminishing the intensity of the sound.

Several years afterwards, viz. in 1837, Professor Bonnycastle, of the United States, performed some experiments, at the instance of the American Government, in furtherance of the inquiry into the transmission of sound in water. The American Government placed at his disposal the brig 'Washington,' in which he prosecuted his inquiries. He provided a small *petard* (a species of small cannon), about five inches long by two and a half in diameter, with adjustments suitable for discharging it under water. As a sound-receiver, he provided a tube of tinned iron, eight feet long by an inch and a quarter in diameter, terminated at one extremity by a trumpet-shaped mouth twenty inches in diameter. He also had a cylindrical tube, similar to that employed by Colladon, closed at one end, and capable of being immersed to half its length in the water. He provided likewise a very delicate chronometer or time-measurer, capable of measuring fractional parts of a second of time. The ship's bell was removed from its place, and adjusted so as to be rung under water.

With these instruments Mr. Bonnycastle sought to determine how far distant a sound could be heard, when produced under water, and listened to with the aid of either of the two tubes. He found that the trumpet-shaped tube, being open at both ends, admitted water into its interior, which effectually interfered with the success of the experiments. With the cylindrical tube, he heard the sound of the bell at a distance of a quarter of a mile, but at the distance of a mile the sound was wholly inaudible, thus presenting a marked contrast to the results obtained by M. Colladon; a contrast due, probably, to the existence of a current in the one case, but not in the other. He then modified the trumpet-shaped instrument, so that the mouth should be at right angles with the stem, and thus directed towards the bell; and he also covered the mouth with thin metallic plate. These alterations being made, he found that the trumpet-tube conveyed the sound much more distinctly than the cylindrical, the difference being more and more marked as the distance was increased. The results, however, were not on the whole so satisfactory as those of M. Colladon.

Mr. Bonnycastle then entered upon the experiments which were the main objects of his attention, and for which the American Government had thought fitting to assist him. These were, to determine whether the *depth of the sea* could be found by the echo of a sound from its sandy bottom. It is known that in the open air the interval which elapses between the production of a sound and the return of its echo depends exactly on the distance of the echoing surface, and these quantities have been determined with very great exactness: thus, if a sound is echoed from a wall, and returns to the sound-producing instrument exactly one second after it was produced, then the wall is known to be about five hundred and sixty-five feet distant. It was an analogous mode of calculation which Mr. Bonnycastle sought to obtain in the sea. The ship was moored at a considerable distance from the land; the hearing tube was placed vertically in the water; the petard was lowered; and the observers prepared themselves to listen for the echo. When the petard was fired, two distinct blows were heard, at an interval of about one-third of a second apart; the two shocks were also heard at the ship, and at the same interval apart. If the one was the echo of the other, then the echoing surface must have been about one hundred and sixty fathoms distant; whereas on sounding, the bottom was found at five hundred and fifty fathoms. On the following day the experiment was repeated very close to the shore, when the interval of one-third of a second was still perceived between the shocks: this showed that the second could not have been an echo of the first from the bottom of the sea; and Mr. Bonnycastle considers that he has failed in his object, at least so far as present modes of experiment are concerned.

Still more recently, M. Colladon has stated that he has renewed his experiments, with a view to follow out the attempts made by Mr. Bonnycastle. In a letter to M. Arago, a year or two ago, he gives several new results which he had obtained by his apparatus, which led him strongly to think that a useful mode of maintaining correspondence by submarine transmission of sound may one day come into use. On one occasion, M. Colladon had placed at his disposal a bell belonging to one of the churches at Geneva, weighing five hundred kilogrammes (eleven hundred pounds). This bell was suspended to an apparatus placed on a vessel, by means of which it was easy to sink the bell in the water and draw it up again. It was sunk to the depth of three metres (about ten feet), in a place where the water was about fifteen metres deep; and to strike the bell he used a hammer weighing ten kilogrammes, fixed to a long iron handle, the upper part of which was above the water and was bent at right angles. With this apparatus he made many experiments, and found that he could hear the sound of the bell under water distinctly at a distance of thirty-five thousand metres (considerably above twenty miles). M. Colladon states that the noise of a chain moving under water is so distinctly perceptible, that it may be known when a vessel, three thousand or four thousand metres distant, raises her anchor; and he hints that this may be found advantageous in time of war.

Should the transmission of sound under water be hereafter applied to a useful purpose, it will be owing mainly to the circumstance that the intensity of sound dies away less rapidly in water than on land. The possibility of applying this method to the determination of the depth of the sea, seems to be a problem yet to be solved; for the experiments hitherto made have not afforded satisfactory results.

THE GLACIERS OF THE ALPS.

Within the last few years the subject of *Glaciers* has engaged the attention of scientific men to a very marked degree. The principal appearances presented by these vast masses of ice among the Alps, as well as certain facts concerning their movements and the effects which they produce, have been long familiar to scientific travellers in Switzerland. But M. Agassiz of Neuchâtel having broached a theory of a very bold and original kind, to account for their formation, a new zest has been given to the subject, and expeditions are now made every summer from all the countries in Europe to the Alps, by persons desirous of testing the new views by actual observation. How some of these tourists fare while on these expeditions, we briefly noticed in a recent number (747). We shall now endeavour, without hazarding any opinion whatever as to the soundness or unsoundness of M. Agassiz's theory, to state the broad features of the subject so far as we can in a popular form.

Saussure, one of the most successful of Alpine travellers, gives an imaginary bird's-eye view of part of that range as a means of showing the nature and position of the glaciers. He says that, if a spectator could be imagined at such a height as to embrace within his view a large group of the Alps, he would see a mass of mountains intersected by numerous valleys, and composed of several parallel chains, the highest in the middle, and the others decreasing gradually as they recede. The central and highest chain would appear to him bristled with craggy rocks, covered throughout the year with snow and ice in all those places that are not absolutely vertical; but on both sides of the chain he would see deep and verdant valleys, well watered and covered with villages. When he looked more in detail, he would see that the central range is composed of lofty peaks and smaller chains, covered with snow on their tops, but having all their slopes that are not very much inclined covered with ice, while the intervals between them form elevated valleys filled with immense masses of ice, extending down into the deep and inhabited valleys which border on the great chain. The chain nearest to the centre would present to the observer similar appearances, but on a more limited scale, beyond which he would see very little more snow or ice.

The masses of ice here alluded to are the *glaciers*. They occupy two different positions: in one case they are on the sloping sides of lofty mountains; and in the other they occupy the depressions of elevated valleys. Of these glaciers there have been reckoned about four hundred between Mont Blanc and the Tyrol; and they vary in size from three to fifteen miles in length, from one to three miles in breadth, and from one hundred to six hundred feet in depth or thickness. The surface of these glaciers is very unequal. Sometimes, when the ground on which they lie is but slightly inclined, the surface of the glaciers, though rough and granulated, is tolerably even, presenting but few crevices; but if the bed be inclined so much as thirty or forty degrees, the ice breaks into fragments, and these fragments get displaced and heaped together in the most fantastic form, having among and between them chasms of a hundred feet or more in depth. In some instances the surface of the glacier is purely white; but this only occurs in the upper valleys, where few rocky fragments can fall into it. In the lower valleys, and on the gently sloping sides of mountains, the glacier is generally covered with large blocks of stone, or with mud and sand resulting from the abrasion of those blocks. The overlying stones give rise to very fantastic appearances.

During all parts of the year in a greater or less degree, but especially in summer, there are torrents of water flowing out from beneath the glaciers, occasioned by the partial melting of the ice, either by solar heat or by the internal heat of the earth. These streams give origin to the Rhine, the Rhône, the Danube, the Po, and many other important rivers; and in their progress through the body of the ice, they scoop out large and lofty caverns, which often present very remarkable and picturesque appearances.

The glaciers descend slowly a little every year, varying in distance according to the declivity of the ground and the warmth of the season. The ice appears to adhere pretty closely to the sides and bottoms of the valleys during winter; but when the warmth of summer heats the soil all around, and thaws the ice at its surface and edges, the liberation of the glacier ensues, aided by the action of the currents flowing beneath, and by the friction of masses of ice and of stone. It often happens that the vast field of ice slips down very slowly till it comes quite close to the green cultivated patches of ground attached to the cottages of the peasants. In the valley of Chamouni, Ebel found that the glaciers advance about fourteen feet in a year; in that of Grindelwald the glaciers move rather faster, being at the rate of twenty-five feet in the year. Besides this descent, it is found that the glaciers are subject to other minute changes. If the glaciers are observed for a few years in succession, it is found that they recede occasionally in position, so as to keep a kind of balance in position for a long period.

One of the most remarkable points connected with the glaciers is the existence of ranges of stones in certain definite positions with respect to their length. Along the edges of some of the glaciers, where they spring from or adjoin the rocky soil, are masses of stones accumulated in the form of long parapets, walls, or dykes, to which the name of *moraines* is applied. Some glaciers have a moraine on each side, some have a moraine on one side only, while others are without them. These moraines sometimes attain a height of more than a hundred feet. Not only in the glaciers themselves, but in various other parts of the high mountain-valleys these moraines, or vast walls of loose stones, are found. Besides the moraines at the margins, there are long and high ridges formed of fragments of rocks, boulders, sand, and earth, on the middle of the glaciers, and at a considerable distance from the margins, but parallel to them. In some cases these ridges are thirty or forty feet in height, and several of them occur on one glacier.

These being some of the chief features presented by the Alpine glaciers, we may now notice the customary mode of explaining them, previous to the publication of M. Agassiz's opinions.

On many of the Alpine elevations snow falls for the greater part of the year. This snow accumulates in immense masses, which are precipitated in the form of *avalanches* from the ridges into the upper valleys. By spring-time these masses have become heaped up into an enormous aggregate; and during the summer the heat of the sun melts a good deal of the snow and produces streams and torrents which form the sources of considerable rivers; but as the mass is more than can become wholly melted, the remainder is frozen into the icy field which we call a glacier. The nature of this ice is very different from that of the compact and transparent ice of ponds and lakes; for the rains which occasionally fall, and the water resulting from the partial melting of the snow during the summer, percolate the mass, and, while confined partially within it, become frozen in the ensuing winter. The water, in filtering through the mass, being unable to expel all the air lodged in the interstices, this air together with that which is freed during the subsequen

congelation, collects into bubbles of various forms and sizes, and destroys the transparency and cohesiveness of the ice.

The descent of the glaciers has been thus explained:—During the winter, when the half-snowy, half-icy glacier becomes hardened and fixed to the ground, fresh accumulations of snow are formed at its upper extremity, derived from all the mountain-peaks in the vicinity; and this mass, which increases enormously by the spring, pressing on the upper part of the glacier, forces it irresistibly downwards into the valleys. Sometimes this descent, though slow, is so forcible, that the glacier has been carried not only into a valley, but quite across it, and has even ascended some distance on the opposite side.

The formation of the *moraines* is thus explained:—When the rocks bordering the glaciers are themselves bare of snow or ice, in consequence of the rapidity of the slope, and are stratified, they are easily disintegrated by the alternate action of wet and frost, heat and cold, and the fragments thus detached roll down to the side edges of the glacier, where the greater part are stopped, while some isolated blocks are urged further towards the middle. The general inclination of the glacier and its downward motion are the means of collecting a quantity of these fragments at the lower edge of the glacier, so that in some cases the whole glacier is surrounded by a moraine. The parallel ridges of stones on the glacier itself have been accounted for thus:—The glacier, slipping down gradually upon the inclined bed of the valley, recedes from the sides, carrying part of the lateral moraine along with and upon it. This retreat always leaves a considerable space, particularly in the wider valleys, between the foot of the mountains and the edge of the glaciers, which space during the succeeding winter becomes filled up with fresh snow, which becomes again converted into ice, and on which a new moraine is collected. This recedes like the first, and so on, whereby the surface of the glacier becomes covered with parallel ridges of stones.

M. Agassiz, as a means of explaining these and a great many other phenomena observable in mountain valleys, directs attention back to a remote period when, as he supposes, a large part of what is now Europe was one sheet of ice; and he then conjectures that the present Alpine glaciers are merely the remains of that ice. In many parts of Europe there are rocks exhibiting singular furrows in their surfaces in a parallel direction, and other rocks whose surfaces have been polished by some kind of friction. No circumstances at present observable seem to afford an explanation of these effects, and therefore some writers have referred them to some sort of current acting at a former period; but M. Agassiz thinks that, whether occurring in the Alps, in France, in Scotland, or in Sweden (for they have been observed in all these places), these furrows and abrasions have been occasioned by the movement of ice at some remote period.

M. Agassiz assumes, as the basis of his views, that at one time the polar ice extended as far towards the equator in the north as it now does in the south hemisphere; and thinks that all the effects connected with glaciers, &c. may be deduced from such a state of things. There is a belt of stones running across the centre of Russia at about 50° lat.; and many persons have supposed that these must have been brought there by a current or flood of some kind from the north. But M. Agassiz thinks they once marked the southern margin of an immense glacier or sea of ice, extending thence northward. There is another belt of stones further north; and these, he thinks, formed the glacier-limit at a later period, when the hemisphere was becoming warmer and the ice receding farther towards the pole.

In Switzerland, at a height of nine thousand feet among the Alps, there is a kind of boundary or limit, below which there are repeated instances of moraines or ridges of loose stones, grooved and scratched rocks, and polished rocks; whereas above this boundary the peaks do not exhibit these appearances. M. Agassiz hence concludes that this height marked the upper level of the ocean of ice which once filled all the valleys of the Alps, and that this ice, having upon it, and beside it, and beneath it, fragments of rock, and melting as the hemisphere became warmer, furrowed, scratched, and polished the surfaces of the rocks which it met with in the descent, the ice itself sometimes producing the mechanical effect, and at other times the stones which it bore along with it. According to the nature of the rock which composed the valley and the flanks of the mountain, so would it be acted on more or less by this kind of friction.

There are immense blocks of stone on and among the Jura mountains of Savoy, placed at such an elevation as has puzzled geologists to explain how they got there. M. Agassiz assumes that when the whole Alpine district, except the higher peaks, was enveloped in ice, fragments of rock became broken off from these peaks, and falling upon the ice, were by it transported, in proportion as it melted or gave way, to considerable distances, where they obtained lodgment on solid ground in various positions. There are in Scotland some curious parallel terraces on either side of two or three glens near the Caledonian Canal, the terraces being strictly on a level, and following the windings of the glen with great uniformity. These terraces have obtained the name of the "parallel roads of Glenroy." Some have thought that in early times these were roads artificially formed; in later times it has been supposed that they are the sedimentary deposits on the banks of what were once lakes; but the "glacial theory" of M. Agassiz has recently been brought to bear upon them, and it is supposed that these valleys were once filled with ice, the parallel roads being consequences of the descent of the glaciers at a later period, when the ice was about to disappear.

To follow out the details of this remarkable theory is not our object: but as the "glacial theory" is now becoming a matter of prominent interest in scientific works, and as men of science have to a certain extent divided themselves into 'glacialists' and 'non-glacialists,' according as they do or do not agree in opinion with M. Agassiz, we have thought it right to give a slight idea of what the term means, and what is the subject under consideration. It will be convenient, then, for those who may meet with discussions on the subject, to bear in mind that the "glacial theory" supposes a time to have existed when many of the countries of Europe were enveloped in ice nearly to the tops of the highest mountains; that this ice melted as the northern hemisphere gradually became warmer; that fragments of rock became transported by the ice to great distances; that the ice and the fragments furrowed, scratched, or smoothed the rocks over which they passed; that all the lower valleys and plains have become so warm that the ice has disappeared from them; that the higher valleys and the sides of mountains in the Alps still exhibit remnants of this ice in the form of glaciers; and that the boulders and other masses of stone observable in particular situations have been brought thither while ice was yet in or near those parts.



[Greensted Church.]

CHURCH AT GREENSTED, ESSEX.

[From a Correspondent.]

Greensted is a little secluded village about a mile from Ongar and twenty from London. Consisting of a few scattered farm-houses and cottages, and without a public-house of any kind, it would not be easy perhaps to find a quieter spot within the same distance; nor, in its way, a pleasanter. Lying out of the main road, however, neither its pretty green lanes nor its old church appear sufficiently attractive to induce the visits of many strangers. Yet its church is a remarkable structure. It is held by many to be a genuine Anglo-Saxon wooden building; at least its nave is so held. Of late, it is the fashion to call such buildings Norman. Greensted Church is, however, associated with an occurrence very characteristic of the Anglo-Saxon period, and we shall therefore consider it Anglo-Saxon.

It will be remembered that in one of the early incursions of the Danes into England (A.D. 870), Edmund, king of East Anglia, was taken prisoner by them, and, refusing to abjure the Christian religion, put to a cruel death. He was a favourite of the people, but especially of the priests; and came naturally therefore to be spoken of as a martyr, and his remains to be held in estimation as those of a saint. In the reign of Ethelred the Unready, the Danes, emboldened by the cowardice or feeble policy of the king, who only sought to buy them off from day to day, and made tyrannous by the diminished opposition everywhere offered to them, ravaged the country in all directions, until at length, in the year 1010, "that dismal period," as Mr. Sharon Turner calls it, "their triumph was completed in the surrender of sixteen counties of England and the payment of 48,000*l.*" In this year the bones of St. Edmund were removed from Ailwin to London, to prevent their falling into the hands of the Danes.* They appear to have remained in London about three years, when they were carried back to Bedricsworth (Bury St. Edmund's). A MS. cited by Dugdale in the 'Monasticon,' and entitled '*Registrum consobii S. Edmundi*,' informs us that on its return to Bury, "his body was lodged (*hospitabatur*) at Aungre, where a wooden chapel remains as a memorial to this day." It is this same "wooden chapel" which is supposed to form the nave of Greensted Church. The inhabitants of the village have always had a tradition that the corpse of a king rested in it, and the appearance of the building vouches for its great antiquity.

Greensted adjoins Ongar; and that the ancient road from London into Suffolk ran through Old Ford, Abridge, Stapleford, Greensted, Dunmow, and Clare, is evident as well from the remains of it that are still visible, as from tradition. Stanford Rivers, the parish adjoining Greensted on the London side, is thought to be so named from the *stone ford* which was there made across the Roden for the convenience of the traffic along that road. We are told by the register above mentioned that the wooden chapel remained afterwards in memory of that transaction; so that it might in process of time, with proper additions made to it, be converted into a parish church. And of the antiquity of Greensted as a parish there is plenty of evidence; thus we find by *Newcourt* that Simon Feverell succeeded John Lodet as rector of *Grinsted juxta Ongar* in 1328. He says likewise that Richard de Lucy very properly divided the parishes of Grinsted and Ongar, and built the church at Ongar, in the reign of Henry II. But it has never, we believe, been questioned, says Mr. Letheuillier, that the nave of the present church is the identical wooden building erected as a shrine for Edmund's corpse just eight hundred and thirty years ago.

The building is as simple in its construction as we might expect from the object for which it was erected —a rural chapelry in a large parish. It is formed of the trunks of oaks about a foot and a half in diameter, split in half and roughly hewn at each end, to let them into a sill at the bottom, and into a plank at the top, where they are fastened with wooden pegs. This is the whole of the original fabric which yet remains entire, though much corroded and worn by time and long exposure to the weather. It is twenty-nine feet nine inches long by fourteen feet wide, and five feet six inches high on the sides which supported the primitive roof. The oaken trunks are arranged as closely side by side as their irregular edges will permit. On the south side there are sixteen of them, and two doorposts, with an opening for the entrance; on the north side there are twenty-one, and two vacancies filled up with plaster. The ends were similar, but the eastern has been removed and the church enlarged by the addition of a brick chancel; the western end re-

* The following particulars, with the admeasurement of the church, are mostly taken from a description contributed to the Society of Antiquaries by S. Letheuillier, Esq., and published their 'Vetusta Monumenta,' 1747.

mains, but is hidden by a wooden tower that has been erected against it. On the south side there is a wooden porch, and both sides have been strengthened by brick buttresses.

The old wood appears little more decayed now than when Mr. Letheuillier described it, nearly a century since, as much corroded and worn by time. It is so blackened with age that it is not easy to tell what kind of wood it really is. Mr. Letheuillier, as we have seen, says it is oak, and his account is generally received; we have heard very good judges affirm it to be chestnut, but, although we examined it closely, we were unable to decide the point without cutting the wood, and that we were unwilling to do. The brick chancel which has been added to its east end appears younger than the nave; it probably, judging from the carved mouldings of the blunt-pointed arch of the doorway,* belongs to the later Norman period. Altogether, the church, though rudely venerable in appearance, has so substantial a look as almost to promise, if carefully attended to, to last another eight centuries.

We know of few churches near London more deserving of a visit; few that have such strong claims in themselves; and none that have been so little injured by modern improvements, or so little defaced by recent embellishments. And, like all old churches and few new, it seems to accord most felicitously with the spot on which it is placed. There is nothing about the church or the scene to weaken the strong feeling sure to be excited by the sight of so remarkable a relic of a remarkable period. Nor need the imaginative visitor fear that his ruminations will be interrupted by inquisitive intruders or troublesome guides. He may let his memory recal, or his fancy picture, the uncouth pageant of that day, when our Saxon ancestors in their quaint costumes crowded from every adjacent hamlet to gaze upon the reliques of their king, martyr, and saint; and nought will disturb the vision or break the deep silence, unless it be the song of the lark or the call of the thrush, or the distant sound of a flail.

The scenery too about Greensted is much pleasanter than Essex scenery is usually considered. Stanford Rivers and Navestock on one side, with Ongar on the other, offer some walks of much beauty, and there are green lanes all about the neighbourhood, such as it is a delight to meet with.

Our engraving is from an original sketch, and represents the present appearance of the church.

* In the plate in the 'Vetusta' this is inaccurately represented as a round arch.

THE FLOODS AND AVALANCHES OF THE ALPS.

THE sudden inundations of snow, or of ice, and of water, to which the Swiss villages are liable from the neighbouring mountains, are so intimately connected with the formation and the movement of *glaciers*, that they cannot be understood without reference thereto; and we will therefore refer to our recent paper on the nature of glaciers (No. 756) as a means of illustrating the details contained in the present article.

It was stated in the former paper that the Alpine glaciers occupy either the higher valleys or else the sloping sides of the loftier mountains; and that their gradual descent—be its cause what it may—frequently brings them down into the greater or lower valleys, even so far as to urge them part of the way up the opposite slope. The manner in which this slow movement of glaciers may give rise to catastrophies, we shall presently explain; but we may first notice the *avalanches*, or falls of snow, to which the valleys are exposed.

During many months of the year, snow is almost constantly falling in the higher regions of the Alps; and by degrees the accumulation becomes so great that the inclined sides of the mountains are not able to retain it; it becomes urged onwards by its own weight, and precipitated into the underlying valley, burying forests, villages, cattle, and, too often, human beings beneath it. There are different kinds of avalanches or snow-falls according to the season of the year. The *drift* avalanche, occurring in the early part of winter, results from a heavy snow-storm falling during a calm, and afterwards acted on by the wind. The snow is driven from one acclivity to another, increasing its size as it proceeds, and at length the whole body falls into the valley below; but as the snow is in a light or drift state, it does not produce so much mischief as the *rolling* avalanche, which occurs towards the end of winter. When the immense mass of winter-snow becomes slightly thawed in the spring, the partially melted surface acquires a damp or clammy state, which makes the whole cohere into a more compact mass than the snow previously presented. The snow aggregates into balls or masses, which enlarge by constant additions as they descend; and at length it acquires such an enormous bulk and such a great velocity of movement, that it bears down everything before it, and either crushes or overturns trees, houses, and rocks. In 1749 a whole village was covered by one avalanche, and even removed from its site, and all with perfect stillness so far as the movement of the snow was concerned: a hundred persons were afterwards dug out of the snow, of whom about half still survived. Numerous other cases have been recorded of entire villages being overwhelmed; and there is a well-known narrative of a family who existed for a very long period enveloped in the snow of an avalanche.

Another kind of avalanche, known by the distinctive name of the *sliding*, occurs in the spring. When the surface-snow has been thawed on the lower and less steep declivities, the layers of snow nearest the ground become saturated with water, and thus the whole becomes loosened, giving rise to a gradual sliding movement, which brings the mass to the bottom, but without working so much mischief as the rolling masses. The *ice* avalanche is simply the falling of fragments of ice from the lower ends of the glaciers, loosened by the summer heat.

The manner in which a flood of water, called in the Alpine districts a *debacle*, may be occasioned by a glacier, will next claim our notice.

If there be a narrow gorge between two mountains, and descending to a lower valley beneath, it frequently happens that a glacier occupies this gorge, and descends by degrees till it completely crosses the lower valley. If, further, there be a river flowing through this lower valley, the glacier may so completely stop its path as to form a dam, behind which the waters of the river will rise and form into a lake. This was precisely the circumstance which occurred in Switzerland in 1818, when a fearful consequence followed. The details have been given by M. Escher de la Linth, in the 'Philosophical Journal,' and in one of the sketches by Captain Basil Hall, who visited the spot immediately after the catastrophe. From these two sources we will transcribe the chief details.

The Val de Bagnes, near Martigny, is a steep, narrow, rugged valley or rocky glen, running for about thirty or forty miles in an east and west direction among the mountains which separate Switzerland from Piedmont. The mountains have numerous glaciers in their gorges or upper valleys, and at one spot a glacier was so circumstanced as to protrude into the valley beneath. This valley has flowing along its bottom the river Drause, a tributary to the Rhône,

some distance above the junction of the latter with the Lake of Geneva. The banks of this river are in most places precipitous; but wherever there is a little spot at all capable of being cultivated, there the hardy and industrious Switzer establishes himself, and builds one of the pretty cottages which have become such favourites among our painters and tourists; so that occasionally along the banks of the river there are little green patches to relieve the otherwise rugged scene. To connect these spots together, slender and rude bridges are thrown across the glen, which has the river flowing beneath, and thus the mountaineers connect themselves into something like a social community.

At a short distance from the upper end of this valley is the spot where the glacier intrudes its icy foot into the channel where the river flows. The glacier itself has not taken up this position, but blocks of ice and masses of snow, derived from it, have been precipitated from time to time, so that the stream has been for a long period more or less impeded. So long back as the year 1595 the valley was completely shut up by the descent of immense masses of ice. The water rose to an enormous height behind this barrier; and on the evening of Sunday, the 4th of June, in that year, the icy barrier having become weakened both by the pressure of the water and the heat of the sun, it gave way. The accumulated waters at once descended the valley with irresistible fury, carrying along with them masses of rock of enormous magnitude, tearing up everything that obstructed their progress, desolating the plains and valleys, and destroying the whole town of Martigny. Many of the inhabitants lost their lives, and the rest were reduced to the most abject poverty.

After this sad event the ice and snow continued to fall into the valley at this spot from the glacier above, as before; and at length they accumulated to such a mass as to resist the heat of the sun in summer, so that a further accumulation took place. The glacier itself, too, continued to travel downwards, so that by the year 1818 the bed of the stream was blocked up by a conical mass of ice and snow more than a hundred feet in height. For some time the river contrived to find its way under or through the crevices in this barrier; but at length, owing to fresh portions of mingled ice-rocks and snow being cast down from the sides of the glacier, the various channels or tunnels which the river had excavated became choked up. As soon as this took place, the waters, having no outlet, began to form a lake, which gradually increased to half a league in length, about seven hundred feet broad at the top, one hundred at the bottom, average depth two hundred feet, and was estimated to contain eight hundred millions cubic feet of water.

Such was the state of things in April, 1818, and it is supposed that no harm would have resulted had the barrier been formed of rocky materials; for in that case, as soon as the water in the lake had risen to the top of the barrier it would have flowed over the edge, and merely formed a cascade. But as the barrier was formed of ice and snow principally, its permanence could not be so justly looked for; and the experienced Swiss, fully awakened to their danger, saw that, unless they adopted some very prompt and energetic measures, the weight of the accumulated waters would soon become too great for the weight of the dam of ice, and the whole reservoir would at once be dashed down the ravine, to the destruction of all the villages, fields, bridges, and mills, which, although built on sufficiently elevated spots to escape common overflows, would be swept away by such a one as this.

Under these circumstances, a bold and enterprising engineer of Martigny, M. Venetz, set about devising a plan which, though it could not prevent the evil, might possibly lessen it. He conceived that the water might be prevented from rising above a certain level in the lake, if a gallery or tunnel could be cut through the barrier of ice at such a height above the level of the lake at that time as would enable the work to be finished before the water should rise to that point. This required not only a very nice calculation, but a great degree of vigour and activity in the execution. The drift or gallery which M. Venetz proposed to bore through the barrier was made to slope downwards, in such a way that when the water rose to its upper end it should flow so rapidly through that it might act like a saw, and, by cutting down the ice, permit the water from the lake gradually to descend, till it was nearly emptied, and the mass of water be prevented from becoming an overmatch for the retaining wall of ice and snow.

These bold and ingenious operations were begun on the 10th of May and finished on the 13th of June. The gallery was sixty-eight feet long (being the thickness of the barrier at the spot chosen for the perforation), and during its formation the workmen were exposed to the constant risk of being crushed to pieces by the falling blocks of ice, or of being buried under the glacier itself. In the mean time the surface of the lake had risen sixty-two feet, but as it had not yet reached the upper orifice of the gallery, M. Venetz, having secured a thorough opening through the barrier, set to work to cut down the floor of the tunnel till it met the rising waters, which then began to flow rapidly through the passage. The floor of the gallery went on wearing away, as had been anticipated, so fast that by the next day the lake had diminished in depth one foot; and this evidence of the power of the engineer began to inspire hope in the terrified inhabitants. On the following day the lake had subsided ten feet; and on the 16th, or only three days after the water had begun to flow through the tunnel, it had sunk forty-five feet. But there was soon to be an end to the hopeful anticipation.

As soon as the water flowed from the lower end of the gallery the velocity of the cascade melted the ice, and thus wore away the gallery at its mouth. The water which had penetrated the crevices of the glacier caused enormous fragments of ice to fall from the lower side of it, so that owing to these causes the body of the glacier, which formed the retaining wall of the lake, was so much diminished in thickness, that the floor of the gallery was reduced from six hundred feet to eight feet in length. As soon as the cascade had cut through the cone of ice, it attacked the shore of the neighbouring mountain, and undermined the glacier by washing away the loose materials forming the bed of the stream on which this mass of ice had been piled up; and having carried it off by degrees, the water next forced an opening between the glacier and the foot of the mountain. As soon as this happened the water rushed out, the ice gave way with a tremendous crash, the lake emptied itself in half an hour, and the sea of water which it contained was precipitated into the valley with a rapidity and violence truly terrible. The fury of this raging flood was first stayed by a narrow gorge, over which a bridge was thrown at a height of ninety feet. But it soon carried away the bridge, and spread itself over a wider part of the valley, then through another gorge, again through a wider part of the valley, and so on, till it reached the Rhône at Martigny, carrying away with it forests, rocks, houses, barns, and cultivated lands.

Captain Basil Hall arrived at Martigny seven weeks after the catastrophe, and thus speaks of what met his view, even in that place, where the fury of the flood had nearly spent itself:—"Many of the houses had been swept away, and all the remaining habitations gave token of having been invaded by the flood, which

even at the lower extremity of the town, where the valley is widest, had risen to the height of ten feet. All the hedges, garden walls, and other boundary-lines and landmarks of every description, were of course obliterated under one uniform mass of detritus, which had levelled all distinctions in a truly sweeping and democratic confusion. In every house, without exception, there lay a stratum of alluvial matter several feet in thickness, so deposited that passages had to be cut through it along the streets, as we see roads cut in the snow after a storm. On that side of every building which faced up the valley, and consequently against which the stream was directed, there had been collected a pile of large stones under all, then a layer of trees, with their tattered branches lying one way, and their roots the other; next came a net-work of timber-beams of houses, broken doors, fragments of mill-wheels, shafts of carts, handles of ploughs, and all the wreck and ruin of the numerous villages which the debacle had first torn to pieces and then swept down the valley in one undistinguishable mass. The lower part of the bark had been completely stripped off all the trees still standing, each one being charged on the side next the torrent with a singular accumulation of rubbish, consisting chiefly of uprooted trees and those wooden portions of the buildings which were bolted together. I ought to mention also, that from every house, and behind every tree, circumstanced as I have described, there extended down the valley a long tail or train of diluvial rubbish, deposited in the swell, or, as a sailor would say, in the eddy, under the lee of these obstacles. All over the plain large boulders, or erratic blocks, lay thickly strewed."

Pavement of Paris.—Paris exhibits a mixture of stone, bitumen, and wood pavements. The principal streets of the city were first paved so early as 1184, by order of the king; but in many of the quarters the streets were unpaved so late as 1640. Beckmann gives a curious account of the police regulations concerning the cleansing of the streets, from which we may infer that road-ways were in a very miry state; indeed, modern Paris has not had high credit for the condition of its streets. Sir Henry Parnell, in his 'Treatise on Roads,' remarked that the best kind of Paris paving was thus made:—*A layer of broken stones was* first laid down; then the old paving-stones were laid as a sub-pavement; and, lastly, a new layer of dressed stones for the surface-pavement; forming altogether a very durable road-way. Bitumen pavements have been laid down to a greater extent in Paris than in London. The great Place de la Concorde, many of the promenades on the Boulevards, the foot-paths of the Pont Royal and the Pont Carousel, one side of the Pont Neuf footway, and other public places in Paris, have been paved with one or other of the different asphaltic bitumens.—*Companion to Almanac.*

Trees of Port Phillip.—In point of beauty, it must be confessed that the green-wood tree of the Australian forests, though often rising to a noble height, and as picturesque in its outlines and attitudes as any that bears a leaf, nevertheless stands far below any individual of our English woods. Not that its limbs are less giant-like or less boldly thrown into the air, but there wanting the rich burden of foliage which a colder climate heaps with such profusion on the bending branches; and we miss the shade that spreads around each stem, and diffuses the grateful coolness we were wont to enjoy. In comparison with the plumage of the oak or elm, theirs is a scanty sprinkling of drooping attenuated leaves; a crop so thin-sown as to seem as if dwarfed in its early growth by some blight, and to have remained ever since in a state of premature decay. Moreover, to increase their disadvantages, the hues with which they greet the eye exclude every tint of a bright description, a dull green being the prevailing shade of shrub as well as tree. This it is that tinges every landscape with a degree of monotony and sadness that could not fail to convey a gloomy impression, did we not see the prospect invariably lighted up by a brilliant sunshine, and diversified by natural features of the highest beauty.—*A Summer at Port Phillip, by the Hon. R. D. Murray.*

Population of the United States to the Square Mile.—In 1790, Rhode Island, the most densely peopled state, had 51·5 inhabitants to a square mile. In 1800, Connecticut had the largest number (52·7) of inhabitants to a square mile; in 1810, Rhode Island again, the proportion being 57·4 to a square mile. Since 1820, Massachusetts has been the most populous state, in reference to its size, the number of inhabitants to a square mile having been 69 in 1820, 81 in 1830, and 98 in 1840. Westmoreland has only 74 inhabitants to a square mile, but then this is to be accounted for by the physical peculiarities of the country. No fertile English county contains so few as 100 persons to a square mile; Lincolnshire, which is the most thinly populated, has 138 inhabitants to a square mile. In 1790, the number of inhabitants to a square mile in the whole of the state was 3·9; 5·3 in 1800, 7·2 in 1810, 9·6 in 1820, 12·8 in 1830, and 13·5 in 1840, while at the same time, by the admission of new states into the Union, the territory had been constantly extending. With only 200 persons to each square mile (in England we have above 300 to a square mile), the population of this immense territory would be above 251 millions!—*Companion to the Almanac for 1844.*

The Type of the Spaniards.—In the character of the Iberians some traits may be recognised, which even to this day mark the Spaniard. The grave dress, the temperance and sobriety, the unyielding spirit, the extreme indolence, the perseverance in guerilla warfare, and the remarkable absence of the highest military qualities, ascribed by the Greek and Roman writers to the ancient Iberians, are all more or less characteristic of the Spaniards of modern times. The courtesy and gallantry of the Spaniard to women has also come down to him from his Iberian ancestors: in the eyes of the Greeks, it was an argument of an imperfect civilization, that among the Iberians the bridegroom gave, instead of receiving, a dowry; that daughters sometimes inherited to the exclusion of sons, and, thus becoming the heads of the family, gave portions to their brothers, that they might be provided with suitable wives. In another point, the great difference between the people of the south of Europe and those of the Teutonic stock was remarked also in Iberia: the Iberians were ignorant, but not simple-hearted; on the contrary, they were cunning and mischievous, with habits of robbery almost indomitable, fond of brigandage, though incapable of the great combinations of war. These, in some degree, are qualities common to almost all barbarians; but they offer a strong contrast to the character of the Germans, whose words spoke what was in their hearts, and of whose most powerful tribe it is recorded, that their ascendency was maintained by no other arms than those of justice.—*Arnold's Rome*, vol. iii.

The Orange-Groves of Mexico.—The orange-trees were covered with their golden fruit and fragrant blossom: the forest-trees, bending over, formed a natural arch, which the sun could not pierce. We laid ourselves down on the soft grass, contrasting this day with the preceding. The air was soft and balmy, and actually heavy with the fragrance of the orange-blossom and starry jasmine. All around the orchard ran streams of the most delicious clear waters, trickling with sweet music, and now and then a little cardinal, like a bright red ruby, would perch upon the trees. We pulled bouquets of orange-blossom, jasmine, lilies, dark red roses, and lemon leaves, and wished we could have transported them to you, to those lands where winter is now wrapping the world in his white winding-sheet. The gardener or coffee-planter—such a gardener!—Don Juan by name, with an immense black beard, Mexican hat, and military sash of crimson silk, came to offer us some orangeade; and, having sent to the house for sugar and tumblers, pulled the oranges from the trees, and drew the water from a clear tank overshaded by blossoming branches, and cold as though it had been iced. There certainly is no tree more beautiful than the orange, with its golden fruit, shining green leaves, and lovely white blossom with so delicious a fragrance. We felt this morning as if Altacamulco was an earthly paradise. . . . But when the moon rose serenely and without a cloud, and a soft breeze, fragrant with orange-blossom, blew gently over the trees, I felt as if we could have rode on for ever, without fatigue, and in a state of the most perfect enjoyment. It was hard to say whether the first soft breath of morning, or the languishing and yet more fragrant airs of evening, are more enchanting.—*Madame Calderon de la Barca.*



[View of Toulouse.]

TOULOUSE.

Toulouse, a city in France, was formerly the capital of the province of Languedoc, and is now the chief town of the department of Haute Garonne, 363 miles in a direct line south by west of Paris, or 438 miles by the road through Orléans, Châteauroux, Limoges, Cahors, and Montauban; in 43° 35′ N. lat. and 1° 26′ E. long.

The notices of this town in ancient writers are more numerous than of most towns in Gaul, and relate to an earlier period: the name was written by the Latin authors and in inscriptions Tolosa and Tholosa. By a similar variation to this last the name has been written in later times Toulouse and Thoulouse, but the *h* is now generally omitted. In the time of the Gauls this city, which belonged to the Volcæ Tectosages, a Celtic nation, contained an enormous treasure in gold and silver, which was seized by the Romans under Cæpio, B.C. 106. As the treasure had been deposited in consecrated places, the seizure of it was regarded as sacrilege; and the misfortunes which afterwards overtook the perpetrators occasioned "the gold of Toulouse" ("aurum Tholosanum") to become a proverbial expression for treasure which brought ruin upon its owners. (Aulus Gellius, *Noctes Atticæ*, III. ix.) Toulouse was afterwards subject to the Romans, the Visigoths, and the Franks, and in the middle ages had counts of its own, who were potentates of great importance in the south of France. The last historical event of importance connected with it was the battle fought, 10th April, 1814, between the allied army under the Duke of Wellington, and the French under Marshal Soult. The English were victorious, and Soult was obliged to evacuate the town.

Toulouse is situated on the right or east bank of the Garonne, which, flowing from the south, bends westward, forming a crescent, on the concave side of which the town stands. As the Canal du Midi, or Canal de Languedoc, which unites the Garonne with the Mediterranean, opens into the river a short distance below the town, and has its course for some distance parallel to the river, the site of the town and its suburbs is a peninsula, enclosed between the Garonne, close to the town, on the west, and the canal at a little distance on the north and east. On the south side, but at some distance, are the heights of Pech-David; and on the east, beyond the canal, and between it and the little river Lers (which flows parallel to the canal, and falls into the Garonne below it), are the heights of Mont Rave, on which the fiercest part of the battle of Toulouse, in 1814, took place.

The town and the suburb of St. Cyprien, which is on the opposite bank of the river, are enclosed by walls, erected in the middle ages, and are united by a bridge of seven arches, the Pont Neuf, about eight hundred and sixty feet long, erected under Louis XIV., from the designs of Souffron, which crosses the river in the middle of the bend. The river is lined with handsome quays. The walls (which have nine gates) appear to have been, in 1814, tolerably entire, and "so thick as to admit sixteen and twenty-four pounder guns;" but later authorities describe them as gradually disappearing in the progress of improvement. Besides St. Cyprien, there are several faubourgs, or suburbs: Bazacle, on the north-west, close to the river; Arnaud-Bernard, on the north; Matabiau, on the north-east; St. Etienne and Guillémérie, on the east; and St. Michel, on the south: the faubourgs Arnaud-Bernard, Matabiau, and St. Etienne extend to the Canal du Midi: and Guillémérie lies beyond the canal, adjacent to St. Etienne. On the south-east side of the town, between St. Etienne and St. Michel, is the Esplanade, a circular space surrounded by trees, planted so as to form four concentric circles, and having six avenues radiating from it, each with four rows of trees, forming three alleys. The streets of the town itself were, till of late years, narrow and crooked; the squares irregular in form, the houses built of brick, and few of the edifices of a handsome appearance; but improvement has latterly been very rapid. The town is still, however, as it were in a state of transition: "its streets, commonly narrow and crooked, become still more irregular, as, in taking care to give them a better direction, old houses are replaced by others arranged upon a new line; so that, with some exceptions, the streets

present only houses, some protruding and some receding." (Malte-Brun.) They are paved with round stones, very fatiguing for foot passengers. The old houses are generally covered with stucco. "The squares are still unfinished, but they show what they will be when completed" (Ibid.): the Place Royale, Place St. George, and Place Angoulême are the handsomest. Ten or more fountains, and a hundred "bornes fontaines," or fountains issuing from walls, serve to cleanse and refresh the streets. Many of these fountains owe their erection to M. Monthel, formerly mayor of the city, and afterwards one of the ministers who signed the unlucky 'ordonnances' of Charles X.: especially he erected one of white marble in the Place Royale, adorned with bas-reliefs of events in the Spanish campaign of 1823.

The principal public buildings are the cathedral, the capitol or Hôtel de Ville, the ex-archiepiscopal palace, and the church of the Grands Augustins, now occupied as a museum. The nave and portal of the cathedral are more ancient than the choir, and are described by Malte-Brun as belonging to "an old heavy Gothic church:" the choir, erected in the sixteenth century as part of a new edifice designed to replace the older one, but which has never been finished, is described by the same author as one of the most beautiful in France. In receiving the judgment of Malte-Brun, regard must be had to the difference of architectural taste in England and France. The choir is not in a line with the nave, so that the whole structure has a very irregular figure, somewhat like this. In the tower of the cathedral is "the bell of Cardaillac," weighing 50,000 lbs. French. The town-hall or capitol is almost entirely a modern building, erected on the site of a more ancient one. It has a front of about 380 feet long by 128 high, and is of most imposing appearance. The court is shown in which the Duke of Montmorency is said to have been beheaded, A.D. 1632, and which must therefore be a remain of the older building. A gallery termed "Galerie des Illustres" is set apart for busts of those persons, natives of the city or connected with it, whom the town has thought worthy of the honour of a place. The ex-palace of the archbishop, now occupied by the prefect of the department, is the handsomest modern building after the capitol. The museum in the cloister and church of the Grands Augustins contains a number of antiquities which have been collected in the department. Besides these edifices may be noticed the theatre; the new court-houses for the Cour Royale and the tribunal de première instance; the veterinary school; the church of La Dorade, built on the site of an ancient heathen temple, and that of St. Saturnin, the interior of which is very impressive; the vast hospitals of the Hôtel Dieu and St. Joseph-de-la-Grave; the mill of Bazacle; the abattoirs; and the bridge and bas-relief at the junction of the Canal du Midi and the Canal de Brienne. This latter canal, which is very short, connects the Garonne at the mill of Bazacle, adjacent to the town wall, with the Canal du Midi. In the Ile de Tounis, a small island in the Garonne opposite the town, and indeed forming part of it (for the island is covered with buildings), are the ruins of the Castle of Narbonnais, the former residents of the counts of Toulouse. Toulouse has scarcely any remains of Roman buildings. There are a large public garden; a botanic garden, rich especially in plants from the Pyrenees and in exotics, where courses of instruction in botany are given; and a public walk, 'Cours Dillon,' in the Faubourg St. Cyprien, on the bank of the Garonne.

The population of the commune of Toulouse in 1826 was 55,319; in 1831, 59,630; and in 1836, 77,372. There are bell-foundries and copper-mills; a very large manufactory of sickles, files, and other hardwares; and a number of establishments for different branches of the iron-manufacture; printing-offices, oil-mills, brandy distilleries, breweries, dye-houses, tan-yards, rope-walks, flour-mills; manufactories of wax, wax-candles, paper-hangings, oil-cloth, musical strings, morocco leather, cotton and woollen yarn, blankets, cotton counterpanes, printed cottons, hats, straw-hats, earthenware, porcelain; and a government stuff-manufactory. Trade is carried on with Spain, with the ports of Bordeaux and Marseille, and with the interior: the Spanish trade is the most important. The chief export is of wheat and flour, the produce of the surrounding country, which was eminent for its productiveness in corn as early as in the time of Cæsar. Toulouse is celebrated also for its ducks'-liver pies, of which a great number are sent to other parts of France. There are two great markets in the year for flowers and salt pork; and eight fairs, including four of eight days each and two of three days: one of the eight-day fairs is an important fair for wool and woollen cloth.

Toulouse is the chief town of the department; it is the seat of a Cour Royale, whose jurisdiction comprehends the departments of Arriège, Haute Garonne, Tarn, and Tarn et Garonne, and of an Académie Universitaire, which has authority over the same departments: it is the head-quarters of the tenth military division, comprehending the departments of Aude, Pyrenées Orientales, Arriège, Haute Garonne, Hautes Pyrenées, Gers, and Tarn et Garonne. It has an assize court, a chamber of commerce, a tribunal of commerce, a tribunal de première instance, or subordinate court of justice, a mint, and several fiscal government offices. There are a royal cannon foundry, an arsenal, and an artillery school.

The archbishopric of Toulouse originated as a bishopric in the third century: St. Saturninus, the first bishop, is said to have suffered martyrdom, A.D. 250: it did not attain to its metropolitan rank till the fourteenth century. It is now united with the archbishopric of Narbonne, to which its bishops were anciently suffragans: the style of the prelate is Archbishop of Toulouse and Narbonne. The diocese includes the department of Haute Garonne, and the archbishop's suffragans are the bishops of Montauban, Pamiers, and Carcassone.

Toulouse is distinguished by the attention of the townsmen to literature. It possesses a number of establishments for public instruction: its schools include two thousand students, and there are several learned societies which distribute prizes. The most eminent of these is the Académie des Jeux Floraux, which distributes prizes for the best poems: the prizes, which are golden flowers, are open to the competition of all France. This society originated in the middle ages, probably in or before the thirteenth century, certainly not later than the fourteenth, and appears to have been an association of trouvères, or troubadours. The poetical contests held by the society, and known as the Jeux Floraux, are thought to have been revived from the neglect into which they had fallen, by Clémence Isaure, a young lady of family, who devoted her property to form a perpetual endowment for these "games," or annual poetical contests, which are still kept up. There is an antient statue of Clémence in the Galerie des Illustres, but the epoch at which she lived is not ascertained. There are an academy of inscriptions, sciences, and belles-lettres; an academy of painting, sculpture, and architecture; a royal college or high school, a seminary for the priesthood, a secondary school of medicine and surgery, a school of arts and trades, a drawing-school; a royal riding, music, and singing school; courses of instruction in

geometry and practical mechanics; on experimental philosophy, chemistry, and midwifery, at the Hôtel Dieu; and societies of medicine, of the fine arts, and of agriculture. There are two public libraries, one of 30,000, the other of 24,000 volumes: one of these (attached to the college) has the prayer-book (les Heures) of Charlemagne, written in golden letters on vellum, given by that prince to the abbey of St. Sernin, A.D. 778. There are (or were lately) eleven printing-offices, twenty-three booksellers' shops: two political journals, and nine devoted to literature and the sciences, are published. There are a botanic garden, a departmental nursery, and an observatory, where courses of instruction on astronomy are given.

There are a society of maternal charity, a Protestant Bible Society, and a society for granting loans on security without interest; two hospitals, an orphan asylum, and six maisons de secours, or houses for the relief of the destitute.

The arrondissement of Toulouse has an area of 612 square miles, and comprehends 138 communes: the population, in 1831, was 139,927; in 1836, 159,064. The arrondissement is divided into twelve cantons or districts, each under a justice of the peace.

USES OF THE POPLAR-TREE.

There is perhaps no tree better distinguished from others, even by those who possess but little knowledge on the subject, than the poplar. Its great height as compared with its diameter singles it out from most other trees, and has a very curious effect in the grouping of a landscape.

This tree is a native of Europe, of North America and of some parts of Asia and North Africa. It is of rapid growth, and is everywhere remarkable for a degree of tremulous motion in the leaves when agitated by the least breath of wind; this arises from the great length of the petioles, in proportion to the size and weight of the leaves to which they are attached. There are different varieties of the poplar, two or three of which we may notice in succession, in reference to their useful qualities.

The *White Poplar* forms a tree from eighty to one hundred feet in height, generally with a clear trunk to a considerable height, and a spreading head thinly clothed with foliage. Many facts have been recorded illustrative of its rapid growth. Evelyn mentions one of these trees at Sion, "which, being lopped in February, 1651, did, by the end of October, 1652, produce branches as big as a man's wrist, and seventeen feet in height." Branches of the white poplar, nine feet long, planted on the banks of a stream some yards from the current, have been known in twelve years to produce trunks ten inches in diameter. It has been stated that one of these trees, planted in a field, and surrounded by a fence at twenty-five feet distance from it on every side, formed by its suckers in twenty years a circular clump of wood fifty feet in diameter; and consequently that thirty or forty trees would cover an acre with a thick wood in the same space of time.

The white poplar, or, as it is sometimes called, the *Abele*, was known to the Romans. As a road-side tree it has been much planted in modern times in Holland, Flanders, France, and Germany. In the forests of France it is in some places so abundant as to form the prevailing tree over extensive tracts of country; and it furnishes fuel for the adjoining towns, more especially for bakers' ovens, those of Paris being almost entirely heated by the wood of this tree, which is then called *bois blanc* (white wood).

As a timber-tree the white poplar does not hold a prominent rank. The wood is very white, and is used in France and Germany for a variety of minor purposes, particularly where lightness of weight or of colour is desirable, or where an artificial colour is to be given to it by staining. It makes excellent packing cases, because nails may be driven into it without its splitting. It is used by the turner and the cabinet-maker, and a great many toys and small articles are made of it. The boards and rollers around which pieces of silk are wrapped in merchants' warehouses and in shops are made of this wood, which is peculiarly suitable for this purpose from its lightness, lessening the expense of carriage. The principal use of the white poplar wood in Britain is for flooring-boards; but for this purpose it requires to be seasoned two or three years before using. When felled at the point of maturity (at the age of about forty or fifty years, if growing on the banks of a river; or sixty or seventy years, if growing in a dry situation) the wood is good for most kinds of building purposes, especially on farms, where it is very suitable for the large folding doors for barns, as it is light and does not warp. It is also used as a substitute for the wood of the lime-tree by musical-instrument makers. In Scotland it is sometimes used in mill-work, and by the cabinet-maker and turner; and it is frequently used by the cooper for making wooden dishes and casks. In Sweden the leaves are eaten by cattle, and are considered wholesome.

The *Black Poplar* is a very large tree, with an ample head, composed of numerous branches and terminal shoots. The bark is ash-coloured, and becomes rough and deeply furrowed by age. This tree is found nearly in the same countries as the white poplar, but it is rather less common in the colder parts of Europe. In a natural state the leaves and young shoots are eaten by cattle.

The timber of the black poplar is applied to most of the purposes connected with the use of white poplar. Its most general use on the Continent is for packing-cases, more especially for the transport of bottled wines. The wood is yellow, soft, and, being more fibrous than that of any other species of poplar, it splits very readily. It is a good deal employed by joiners and cabinet-makers, as being soft and easy to work. The wood never splinters, and was said by Evelyn to be "incomparable for all sorts of white wooden vessels, as trays, bowls, and other turner's ware." It is used for making clogs, and for the soles as well as heels of wooden shoes. It is employed by the cartwright; and it was ranked by Vitruvius among building-timber. When planted thickly, and cut down for rafters, poles, and rails, few trees make a quicker return. In Russia the bark is employed in the preparation of morocco leather; and when it is pulverized it is eaten by sheep: in England it is used, like oak-bark, for tanning leather. The bark of the old trunk, being very thick, light, and corky, is employed by fishermen to support their nets, and is sometimes used as cork for bottles.

The buds, macerated in boiling water, and afterwards bruised in a mortar and pressed, yield a fat substance which burns like wax and exhales a fine odour. The balsamic sap with which the buds are covered forms the basis of an ointment which was much prized in former times. The young shoots, especially when the plants are kept low, may be used as a substitute for the willow in basket-making. When the tree is pollarded and lopped every three or four years, it produces a great quantity of fuel, which can be used green. The shoots with the leaves on are formed into brooms. The cottony substance or flock which surrounds the seeds has been used in Germany and France as wadding; and it has also been manufactured into cloth, hats, and paper; but the expense of collecting it, and the want of length and elasticity in the fibre, occasioned the manufacture to be given

up. In Kamtschatka and in Norway the inhabitants are sometimes under the necessity of drying the inner bark and grinding it, in order to mix it with their oatmeal. The flowers of this tree are said to be much sought after by bees.

The *Lombardy poplar* is the tall slender variety which forms the most distinctive instance of the species. It grows extensively in Lombardy, whence it derived its name; and has become a favourite throughout Europe for the fine effect which it produces in the grouping of an ornamental plantation. Mr. Loudon (whose indefatigable and valuable labours have been recently terminated by death) gives numerous cuts to illustrate the effect of the Lombardy poplar upon landscape scenery.

The wood of this tree is inferior to that of the *black* poplar, but is still serviceable for many purposes. When Arthur Young, the agriculturist, travelled in Italy, he found that the Lombardy poplar grew to the height of forty feet in eight years, and that in twelve years it was fit to be cut down for building purposes. Rafters, small beams, boards, &c., brushed over with coal-tar and brick-dust laid on hot, have stood sixteen years without the least decay. In twenty years the tree produces a trunk two feet in diameter. All the vessels in which grapes were carried home from the vineyards were formerly made of Lombardy poplar planks about two inches thick; but they are now formed of the wood of the black poplar. These kind of vessels last thirty or forty years; and in consequence of the lightness of the wood, they are easily manageable, however large they may be: one of them is generally placed on a four-wheeled cart, and holds fifteen cwt. of grapes.

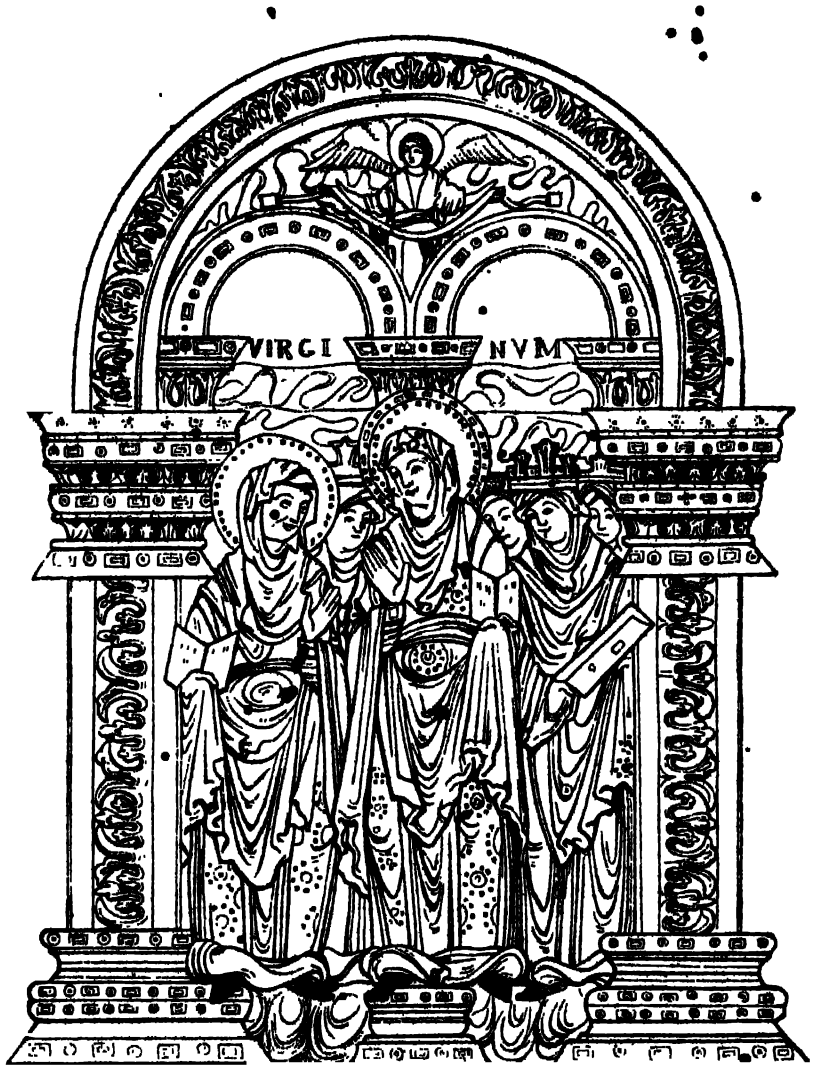
Mr. Murray mentions a curious phenomenon connected with the Lombardy poplar, which is probably attributable to its great height:—"I had frequently observed, in avenues of trees, that the entire space engrossed by their shady foliage was completely saturated with moisture; and that during the prevalence of a fog, when the ground beneath was completely parched, the wet which fell from their branches more resembled a gentle shower than anything else; and in investigating the phenomenon, which I am disposed to consider entirely electrical, I think the elm exhibits this feature more remarkably than any other tree of the forest. I never, however, was more astonished than I was in the month of September, 1828, on witnessing a very striking example of this description. I had taken an early walk on the road leading from Stafford to Lichfield; a dense fog prevailed, but the road was dry and dusty, while it was quite otherwise with a line of a few Lombardy poplars; for from them it rained so plentifully, and so fast, that any one of them might have been used as an admirable shower-bath; and the constant stream of water supplied by the aggregate would (properly directed) have sufficed to turn an ordinary mill." This was probably occasioned by a cloud of vapour, driven towards the trees, being condensed by contact with their foliage.

There are several varieties of the poplar in America. One of these, called by the somewhat circuitous name of the *Various-shaped-leaved Poplar-tree*, is a native of North America, producing a soft light yellowish wood, applied to some few purposes in the arts. Another, called the *Balsam poplar*, yields a balsam, from which its name is derived. This balsam is procured from the buds, and used formerly to be sent from Canada and other parts of North America in shells, under the name of "baume focot;" having been collected from the trees in spring, when, in consequence of the heat, it is dissolved, and collects into drops on the points of the buds. It is of a smooth and even texture, and is soluble in spirits of wine. In Siberia a medicated wine is prepared from the buds, which is diuretic, and considered serviceable in the scurvy. Pallas states that the grouse and other birds of that family that feed on the buds of this poplar during winter have their flesh imbued with a grateful balsamic flavour.

One of the most remarkable varieties is the *Trembling Poplar*, more commonly known as the *Aspen*. The trembling to which its leaves are subjected when the slightest breath of wind blows is owing to the manner in which they are connected to the stalks. The allusions to this tree in our poets and novelists are so numerous, that many will occur to the minds of most readers; but we shall here only mention a few of the uses of the tree.

In the natural state the bark forms the principal food of beavers, in those countries where the animal abounds; and deer, goats, and other quadrupeds are fonder of the spray and buds of this than of any other tree. The young shoots and leaves produced in the form of suckers from the roots, are greedily eaten by cattle and sheep. The wood is white and tender, and is employed by turners; by coopers, for herring-casks, milk-pails, &c.; by sculptors and engravers; by joiners and cabinet-makers; and the makers of various minor articles, such as clogs, butchers' trays, pack-saddles, &c. In France, sabots are made of the wood, and also the bars and pins which serve to retain the bottoms of casks; under-pinnings for flooring, laths, rounds of ladders, and wooden vessels of different kinds. The leaves are employed in France, Germany, and Sweden as food for cattle, sheep, and goats, either in a green or dried state; and they are cut every two years for that purpose during summer. The powdered bark, given in doses of half a pound each, is useful for some of the diseases of horses. In Russia the bark is used in domestic medicine for scorbutic cases. In the Highlands of Scotland the bark of the young trees is sometimes made into torches. As fuel, the wood is of inferior quality; but on account of its giving out its heat with great rapidity, it is deemed fitted for heating ovens and close stoves.

Memory of Bees.—I was living in a town where I knew some few bees were kept, and I chanced to have some coarse comb, from which the honey had drained; so, instead of being greedy, and squeezing out all I could get, I determined to give a feed all round to such bees as chose to accept my invitation to dinner. This invitation I gave by opening the window, and setting the honey on the sill. In about half an hour some foragers found it out; they helped themselves, and carried back the good news to the sisters on the hive. In the course of the morning my room literally swarmed with bees, and I need not tell you, as they are grateful creatures, that they did not meddle with me, but as I sat at my books, repaid me for my treat with their sweet music. In the afternoon they were satisfied, at least for the day, and dropped off, one by one, without committing any excess. There is nothing strange in all this, but now comes the wonderful part of the story: I, myself, got up next morning, some time before bees are usually stirring, and, as I went to my window (it was in September) to see the first rays of the sun in the eastern sky, I was much surprised, and not a little delighted, to see a number of bees, who had remembered and been grateful for their dinner the day before, waiting for me to let them in to a similar breakfast. As some of the honey was left you cannot doubt but that I complied with their wish, which was clear enough to me, though they had no tongue to express it. I opened the window; the room was soon filled; they cleared the combs of honey, and then went orderly away. They haunted my windows for several mornings after, though I had no more honey to give them. This is, I think, a pretty strong instance of memory in bees.—*Colton's Bee-Book.*



[Anglo-Saxon Drawing.—From St. Æthelwold's 'Benedictional.']

THE FINE ARTS AMONG THE ANGLO-SAXONS.

Although the examples are not very numerous, we have proof that the taste cultivated in the cloisters of the Anglo-Saxons was occasionally capable of efforts which would not have been unworthy of that period and that country to which we assign the revival of the arts. We are too much accustomed to think that there was no art in Europe, and very little learning, during what we are pleased to call the dark ages. But in the centuries so designated there were, in our own country, divines, historians, poets, whose acquirements might be an object of honourable rivalry to many of those who are accustomed to sneer at their scientific ignorance and their devotional credulity. At the time when Italian art was in the most debased condition, there was a monk in England (and there may have been many more such whose labours have perished) who, in all the higher qualities of design, might have rivalled the great painters who are held, three centuries later, to have been almost the creators of modern art. In the most successful labours of the Anglo-Saxon cloister there was probably little worldly fame; of rivalry there was less. The artist, in the brief intervals of his studies and his devotions, laboured at some work for several years, which was to him a glory and a consolation. He was worthily employed, and happily, because his pencil embodied the images which were ever present to his contemplation. He did not labour for wealth amidst struggling competitors. Dante says of the first great Italian artists—

> "Cimabue thought
> To lord it over painting's field; and now
> The cry is Giotto's, and his name eclips'd.
> Thus hath one Guido from the other snatch'd
> The letter'd prize: and he, perhaps, is born,
> Who shall drive either from their nest. The noise
> Of worldly fame is but a blast of wind,
> That blows from diverse points, and shifts its name,
> Shifting the point it blows from."

There is an Anglo-Saxon collection of drawings in existence, undoubtedly produced in the tenth century, whose excellence is such that the artist might have pretended "to lord it over painting's field" even

amongst the Cimabues and Giottos. His name is supposed to have been Godemann; but even that is doubtful. To him, whoever he was, might now be addressed the subsequent lines of Dante—

> "Shalt thou more
> Live in the mouths of mankind, if thy flesh
> Part shrivell'd from thee, than if thou hadst died
> Before the coral and the pap were left:
> Or e'er some thousand years have past?"

But he has vindicated the general claims of his countrymen to take their rank, in times which men falsely call barbarous, amidst those who have worthily elevated the grossest conceptions of mankind into the ideal, showing that art had a wider and a purer sphere than the mere imitation of natural objects. The Benedictional of St. Ethelwold, an illuminated manuscript of the tenth century, in the library of the Duke of Devonshire, is the work to which we allude. It is fully described by Mr. Gage, in the twenty-fourth volume of the 'Archæologia;' and the Antiquarian Society, greatly to their honour, caused to be beautifully engraved in their 'Transactions' thirty plates of the miniatures with which this remarkable work is adorned. This manuscript was the ancient Benedictional of the See of Winchester; and it is stated at the commencement of the work, that "A prelate whom the Lord had caused to be head of the Church of Winchester, the great Æthelwold, commanded a certain monk subject to him to write the present book: he ordered also to be made in it many arches elegantly decorated and filled up with various ornamental pictures, expressed in divers beautiful colours and gold." At the end of this introduction, or dedication, the writer subscribes his name Godemann. This monk of St. Swithin's subsequently became Abbot of Thorney. Mr. Gage says, "Although it is likely that this superb volume, filled with beautiful miniatures, and ornaments of the richest design, was finished before Godemann had the government of the Abbey of Thorney, we are sure of one thing, that it was executed in this country between the years 963, when Ethelwold received the episcopal mitre, and 984, when he died. That Godemann was the illuminator of the manuscript, as well as the writer of it, I see no reason to doubt. Illumination was part of the art of calligraphy; and, generally speaking, the miniature painting and the writing in the early manuscript are to be presumed the work of the same hand." To furnish a general idea, though certainly an insufficient one, of the remarkable merit of the miniatures of this book, we present a copy of the fifth plate, as engraved in the 'Archæologia.' It is the second of two miniatures entitled 'Chorus Virginum.' It is fortunately unnecessary that we should attempt ourselves any critical remarks on the rare merits of this early work of Anglo-Saxon art; for in the paper in the 'Archæologia' is inserted a communication from the late Mr. Ottley, whose familiar acquaintance with the works of the early masters, both in painting and engraving, and the general correctness of his judgment, have established for him a high reputation. We extract from his letter a passage which points out not only the beauties, but defects of this work, and of Anglo-Saxon art in general; and further notices the superiority of the best productions of this our early school, both in colour and drawing to the works of its European contemporaries:—

"In the thirteenth century, as every one knows, the art of painting and sculpture in Italy received new life at the hands of Niccola Pisano, Giunta, Cimabue, and Giotto; from which time they steadily progressed, till the happy era of Giulius II. and Leo X. But, for some centuries preceding the thirteenth, I have sometimes seen reason to conjecture, that the arts were in a more flourishing state in various countries distant from Italy than there; to say nothing of Greece, from which, it is probable, the inhabitants of those countries, like the Italians themselves, directly or indirectly, and perhaps at distant periods, originally derived instruction in these matters. That the art of miniature painting, especially, was better known and more successfully practised in France in the thirteenth century, and probably long before, than in Italy, has always appeared to me clear, from the well known passage in the eleventh canto of Dante's 'Purgatorio,' where the poet thus addresses Oderigo d' Agubbio, a miniature painter, said to have been the friend of Cimabue:—

> 'O dissi lui, non se' tu Oderisi,
> L' onor d'Agubbio, e l' onor di quell' arte
> Che allaminar è chiamata a Parisi?'
>
> ('Art thou not Oderigi? art not thou
> Agobbio's glory, glory of that art
> Which they of Paris call the limner's skill?')

"But to return to St. Ethelwold's manuscript. The next thing I would mention is the justness of the general proportions of the figures, especially those larger standing figures of Confessors, female Saints, and Apostles, which occupy the first seven pages of the book. The two groups, entitled Chorus Virginum, are particularly admirable in this respect, as well as for the easy gracefulness of the attitudes of some of them, and the cast of the draperies; so that, had the faces more beauty and variety of expression, and were the hands less like one another in their positions, and better drawn, little would remain to be desired. This deficiency of beauty in the heads, amounting, I fear I must admit, to positive ugliness, appears to have been in a great measure occasioned by the difficulty which the artist encountered in his attempts to finish them with body-colours; as may be seen by comparing these heads with those drawn only in outline in the last miniature in the book; if, indeed, the colouring was not in great part performed by a different person from him who drew the outlines; and, I would add, that the fault is more apparent, throughout the volume, in the large than in the smaller figures. Indeed, the little angels, holding scrolls, or sacred volumes, especially the two last, have so much gracefulness and animation, are so beautifully draped, and so well adapted in their attitudes to the spaces they occupy, that I hardly know how to praise them sufficiently.

"Wherever the naked parts of the figure are shown, there we have most evidence of the incompetence of the artist; and consequently the figures of the Apostles, whose feet and ankles appear uncovered, are less agreeable than those of the above female Saint. But, as you are aware, this unskilfulness in the art of drawing the naked parts of the human figure is not the fault of the painter, but of the period; and indeed, it was not until three centuries after the date of this manuscript, that any notable advancement was made in this difficult part of the art.

"The draperies of the figures throughout the volume, with scarce any exception, are well cast; though the smaller folds are often too strongly marked in proportion to the larger ones; which, with the want of any decided masses of light and shadow distinguishing those sides of objects which are turned towards the light from such as are not so, prevents their producing the agreeable effect which they otherwise would do: but this, again, is more the fault of the time than of the artist. The colouring throughout these Illuminations is rich, without being gaudy. It is possible that in the tenth century some of the gay colours, in the use of which the miniature painters of more modern times indulged so freely, were but little known. If I am

wrong in this supposition, we must accord to the illuminator of this manuscript the praise of having possessed a more chastened taste than many of successors."

It would be absurd to pretend that the work attributed to Godemann is an average specimen of Anglo-Saxon art. The illuminations, for example, are very superior to those of the sacred poem known as Cædmon's Metrical Paraphrase of Scripture History, preserved in the Bodleian Library at Oxford. In these the human figure is badly drawn; and there is perhaps more of invention in the initial letters than in the larger compositions.

LOCOMOTION OF ANIMALS.—No. V.

It was stated in the last number that in walking the leg swings by the force of gravity, like the pendulum of a clock, and that no muscular effort is required for that purpose. Now many persons may naturally ask how has this been discovered, or in what manner can it be proved, and what are the results of this principle in the locomotion of the human race? These are the points which we propose at once to examine. An attentive observer of persons in the act of walking may easily detect that the time of each step is constant in the same person when moving at the same rate; and he will see how very quickly the steps of children are taken, when compared with those of grown persons. A child and a man never take their steps in the same time when they are walking at their natural paces.

These circumstances have recently attracted the attention of Messrs. W. and E. Weber, one of them a celebrated anatomist, and the other a distinguished natural philosopher.

In order to ascertain whether in walking the legs of human beings are moved by means of their muscles, or by any other extraneous force, they made the following experiments on dead bodies:—In the first experiment, the lower extremity of a person, removed at the hip-joint, was suspended by a short string, so that it might move as if it were in its natural position. An impulse having been given, they found that the limb oscillated backwards and forwards nearly in the same time as that of a living person of the same length, when walking at the top of his speed. In the second experiment, they cut through all the muscles of the thigh, and left the thigh-bone adhering to the hip-joint. In this case the leg oscillated rather more frequently than in the preceding one. In a third experiment, they caused the leg to oscillate without cutting its muscles, and they then compared the durations of the movements in the above-mentioned cases with the motions of legs of equal length in living persons. By these means they found that the legs of the latter performed their movements in very nearly the same time as those of the dead, not differing from each other more than from one to two hundredths of a second in each oscillation. Having thus found that death did not sensibly alter the time of the movements of the legs, they concluded that the muscles did not affect them during life. In following out these researches, Messrs. Weber found that the duration of the movement of the legs depended on their lengths, and that the longest leg required the greatest time in its pendulous movement; also that the times of their oscillations varied as the square roots of their lengths, precisely like the pendulum of a clock. We have also found by experiment that the length of each step is proportionate to the length of the legs. In the quickest walking the length of each step is rather more, and in moderate walking rather less, than the length of the extended leg, measured from the hip-joint to the ground.

It must, however, be borne in mind that since the length of a step increases as the length of the leg, whilst the duration of the step only increases as the *square root* of that length, the time occupied by tall persons in taking a step is not so great in proportion as that occupied by shorter persons; otherwise a child would be able to walk as fast as the tallest man. For instance, let us suppose the lengths of the legs of a man and child to be respectively three and two feet: the lengths of these steps will be as three to two, but the durations of the steps will be as the square root of three to the square root of two, or as 3 to 2·45 nearly; that is, the child will take a much longer time than the man for a step in proportion to the lengths of their steps. It appears from this that the respective rates of walking of the man and child, which are proportional to their lengths of step divided by their times, will be very nearly as five to four, so that the man will walk five miles whilst the child walks four. These results are true in all cases of ordinary quick walking, but this may be varied by calling into action extraordinary muscular power, which, however, as we have already stated, can be sustained only for a very short period.

When we speak of the length of a pendulum, such as that of a clock, it must not be understood to mean the whole length of the body of which it is composed, but the distance from its axis of motion to its centre of oscillation.

By the term *centre of oscillation* we are to understand a point in the vibrating body, in which, if the whole mass were concentrated, and attached to the same axis of motion, it would vibrate in the same time as the body actually does in its natural state. The lengths of pendulums may be found experimentally by counting the number of oscillations which they make in a given time; for it is found that the lengths of two pendulums are respectively in the inverse ratio of the squares of the number of oscillations made by them in the same time. If a pendulum be composed of a prismatic rod of uniform density, suspended by one end, its centre of oscillation will be two-thirds of its length from its axis of motion.

In the human leg the centre of oscillation is found experimentally by counting the number of the oscillations which it makes in a given time when suffered to swing freely. It is thus found to be nearly at the same distance from the hip-joint, which is its axis of motion, as if it were a prismatic rod, that is, nearly two-thirds of its length measured from the hip-joint to the sole of the foot; or, more accurately, as the length of the leg so measured multiplied by 0·587, the product of which is rather less than two-thirds the whole length.

As a consequence of the similarity of the motion of the leg in walking to the swinging of a pendulum, and of its depending on the same cause, namely, the force of gravity, we may observe, that a man will find himself able to walk at a sensibly quicker rate in high northern latitudes than at or near the equator. It is well known that a pendulum of given length makes a greater number of oscillations the further it is carried from the equator, for that number varies as the square-root of the force of gravity which continually increases from the equator to the pole; and, since we have seen that there is little if any muscular exertion in the act of walking, so far at least as relates to the backward and forward motion of the legs, we may fairly conclude that gravity will produce the same effect on them as on any other oscillating body similarly circumstanced.

Thus we perceive how dependent our movements are on the quantity of force exerted by gravity on the body, and how admirably the human organs are constituted to act in accordance with the physical state of

the earth; and we shall become more sensible of this fact when we reflect that if the earth's force of gravity on the body had been double, a man would scarcely be able (as now constituted) to support his own weight, and the legs would be only able to force the trunk forwards very slowly, whilst the swinging leg would move through its arc of oscillation in a much less period of time than it now does, and arrive at its destination to receive the trunk long before the standing leg would propel the latter to its destined position. On the surface of the sun, the force of gravity being more than twenty-seven times greater than on that of the earth, a man, says Sir J. Herschel, would be crushed by the weight of his own head; again, on the planet Jupiter, the strongest man could scarcely support his own weight. On the surface of Mars, on the contrary, the power of the muscles would be three times, on the Moon six times, and on the smaller planets twenty times greater than on the Earth; consequently on one of the latter, a man would be able to spring twenty yards high, and sustain no greater shock by his fall than he does on the earth by leaping a yard. These facts serve to illustrate the wonderful manner in which the muscular power of man is adapted to his movements on the earth's surface, and to counteract the force of gravity. Having now shown in what manner the time of a step and its length are regulated in walking, we will proceed to investigate the positions of the two legs during the period of a step. Let us suppose that a person is in the position of figure 1, in which it will be observed that the head of

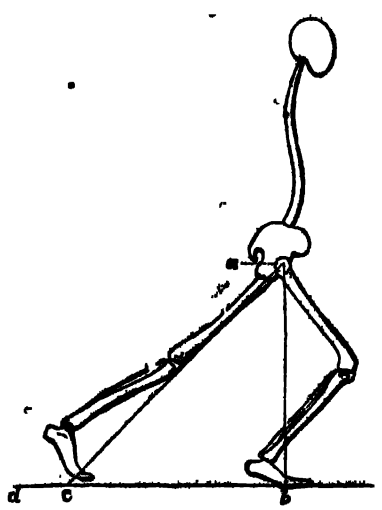
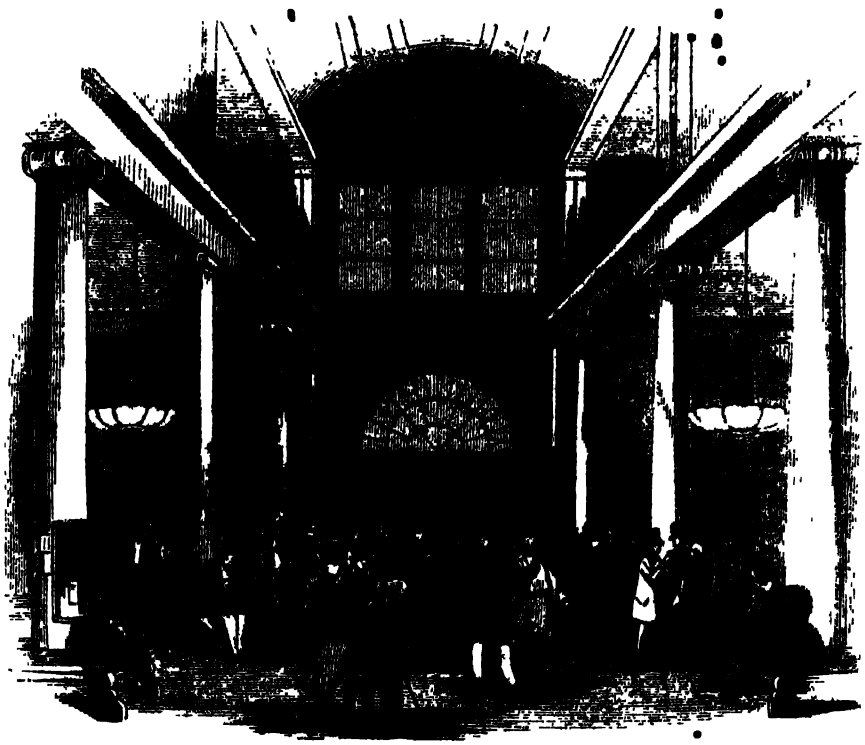


Fig. 1.

the thigh-bone at *a* is vertically over the foot of the same leg *b*, and that the hinder leg is extended to its utmost length immediately before it is lifted from the ground. Now in this position the whole weight of the body is supported by the forward leg, because the centre of gravity of the whole body, which lies nearly in the line joining *a* with the head of the other thigh-bone, is thrown a little on the side of the leg *a b*, so that the vertical line through the centre of gravity may fall within the base of support, the sole of the foot. In this figure *b c* is the length of a single step, and since the squares of *a b* and *b c* are equal to the square of *a c*, we find that the sum of the squares of the elevation of the centre of gravity of the body above the horizontal plane, and of the length of the step, is equal to the square of the length of the extended leg. It is right to mention that, strictly speaking, this expression would be slightly modified by certain circumstances, the consideration of which would lead to details unsuited to a popular treatise.* This position, wherein the legs form with the ground a right-angled triangle, recurs at the beginning of every step. The walker being now in the position preparatory to making a step, namely, that in which the extremities of the two legs form with the ground a right-angled triangle, and the right leg in advance of the left, let us follow him through the step, and mark its several stages. The left leg is first raised from the ground, and the knee and ankle joints are bent, in order to shorten the leg and allow it to swing freely in the air. It then swings forwards, and, passing the right leg, is placed on the ground in a new position, as far in advance of the standing leg as it was previously behind it: during this period the centre of gravity advances in an almost horizontal line, and the supporting leg, which at the beginning of the step was bent at the knee and ankle joints, is gradually extended until it is in a position precisely similar to that of the other leg at starting. It has been already mentioned that in this action the supporting leg not only bears the whole weight of the body, but pushes the centre of gravity upwards and forwards, in consequence of which the trunk is thrown in advance of the base of support, and would fall downwards, but the left leg arriving immediately under the advanced position of the trunk, receives its weight and prevents its falling; when the trunk is thus caught by the forward leg, the latter slightly bends at the joints, so that the shock caused by the foot with its burden reaching the ground becomes almost imperceptible.† The left leg having now taken a position in advance of the right, and been placed in a state fit to support the whole of the trunk, the right leg is free to move in a similar manner; and thus in walking the two legs interchange their offices alternately. If we examine the action of the supporting leg, we shall find that it exerts two forces, one of which pushes the centre of gravity upwards, and is exactly equal to and counteracted by the weight of the body; the other urges the centre forwards, and is equal to the sum of the resistances, such as that of the forward leg when placed on the ground, the air, the friction of the body, &c., which act in an opposite direction, and tend to drive the body back, so that the movement of the centre of gravity is very nearly uniform, at least its mean motion may be considered as actually so. It may appear to some rather paradoxical that the force which drives the body forwards in a uniform motion should equal those which drive it backwards, yet the necessity of this becomes apparent when we reflect that if the force employed at every step to urge the body forwards were greater than that which impedes its progress, there would be in walking a constant accumulation of force in a forward direction, which would impel the trunk faster than the legs, and the latter could not keep pace with the trunk without great muscular labour, which would soon produce exhaustion, and the walker would consequently be obliged to stop, or else would quickly fall to the ground on his face. This evil is prevented by the above-mentioned mechanical condition, namely, that the forces which drive the centre of gravity of the body forwards in walking, are equal to those which drive it back.

* Those who wish to pursue this subject farther may consult Dr. Todd's 'Cyclopædia of Anatomy and Physiology,' Art. *Motion*.

† How great and painful the shock would be were the joints not to bend, may be imagined by those who have in walking unintentionally descended a step whilst they fancied themselves on level ground; in this case the leg is placed on the ground in a rigid state, and causes a severe shock to the body, more especially to the spinal column.



[Stock Exchange, Capel Court]

THE STOCK EXCHANGE.

[Extracted from 'London,' No. CXLIV.]

Towards the close of the last century the increased scale of transactions in the Funds, and the new loans which were continually being raised, induced the principal frequenters of the stock-market to subscribe for the erection of a building for their accommodation. Capel Court, on the east side of Bartholomew Lane, once the residence of Sir William Capel, Lord Mayor in 1504, was fixed upon as a convenient situation for the purpose. The first stone was laid on the 18th of May, 1801, and contains an inscription, which states, for the information of remote posterity, that the national debt was then upwards of five hundred millions. This building, which is the present Stock Exchange, was opened in March, 1802. The entrance to Capel Court is nearly opposite the door at the east end of the Bank, leading to the room in that building called the Rotunda.

No one is allowed to transact business at the Stock Exchange unless he is a member. If a stranger unluckily wanders into the place, he is quickly hustled out. There are about three hundred and fifty firms of stock-brokers in London, whose places of business are situated in the streets, courts, and alleys within five minutes' walk of the Royal Exchange. To these we must add thirty or forty bullion, bill, and discount brokers. All the more respectable of these money-dealers are members of the Stock Exchange, and the total number of members is at present about six hundred and fifty. The admission takes place by ballot, and the committee of the Stock Exchange, which consists of twenty-four members, is elected in the same manner. Every new member of the "House," as it is called, must be introduced by three respectable members, each of whom enters into security in 300*l.* for two years. At the end of two years, when the respectability of the party is supposed to be fairly ascertained and known, the liability of the sureties ceases; but, as each member of the house is re-elected every year, if in the course of the preceding twelvemonth there is anything discreditable in his conduct, he is not re-elected. If a member becomes a defaulter, he ceases to be a member; though, after inquiry, he may be re-admitted on paying a certain composition; but he must be re-admitted, if at all, by vote of the committee. When a member becomes unable to pay his creditors, there are certain official assignees who receive all the money due to him and divide it amongst his creditors. No man can be re-admitted unless he pays 6*s.* 8*d.* in the pound, from resources of his own, over and above what has been collected from his debtors. As some of the practices of the Stock Exchange are contrary to law, and cannot be enforced in the courts, the members are only to be held to them by a sense of honour, and such restraints in the way of exposure and degradation as the governing committee may be authorised to apply by the general body of members. Cases of dishonourable or disgraceful conduct are punished by expulsion. The names of defaulters are posted on the "black board," and, in the language of the Stock Exchange, they are then technically called "lame ducks." In short, the committee have the power of effectually destroying the credit of a member whose transactions are of a dishonourable nature. They investigate the conduct of members whenever called upon by other parties, and give their award according to the evidence.

The two leading classes of men who have dealings on the Stock Exchange are the jobbers and the brokers, though the business peculiar to each is not unfrequently transacted by one person. Some members deal for the most part in English stocks, others in foreign, and many confine their attention principally to shares in mines, railways, canals, joint-stock banks, and other public companies; some call themselves discount-brokers and money-dealers, and transact business to a large extent in commercial securities—that is, in bills

drawn by merchants and tradesmen on mercantile transactions. Bargains are made in the presence of a third party, and the terms are simply entered in a pocket-book; but they are checked next day, and the jobber's clerk (their clerks are members also of the house) pays or receives the money, and sees that the securities are correct. There are but three or four dealers in Exchequer Bills, and the greater number of these securities pass through their hands. The majority of the members of the Stock Exchange employ their capital in any way which offers the slightest chance of profit, and keep it in convertible securities, so that it can be changed from hand to hand almost at a moment's notice. The brokers are employed to execute the orders of bankers, merchants, capitalists, and private individuals; and the jobbers on 'Change are the parties with whom they deal. When the broker appears in the market, he is surrounded by the jobbers. One of the "cries" of the Stock Exchange is "Borrow money? borrow money?" a singular one to general apprehension; but it must be understood that the credit of the borrower must either be first-rate or his security of the most satisfactory nature; and that it is not the principal who goes into this market, but his broker. "Have you money to lend to-day?" is a question asked with a nonchalance which would astonish the simple man who goes to a "friend" with such a question in his mouth. "Yes," may be the reply. "I want 10,000*l.* or 20,000*l.*" "On what security?"—for that is the vital question; and that point being settled, the transaction goes on smoothly and quickly enough. Another mode of doing business is to conceal the object of the borrower or lender, who asks, "What are Exchequer?" The answer may be, "Forty to forty-two." That is, the party addressed will buy 1000*l.* at 40*s.*, and sell 1000*l.* at 42*s.* The jobbers cluster around the broker, who perhaps says, "I must have a price in 5000*l.*" If it suits them they will say, "Five with me, five with me, five with me," making fifteen; or they will say each, "Ten with me;" and it is the broker's business to get these parties pledged to buy of him at 40, or to sell to him at 42, they not knowing whether he is a buyer or seller. The broker then declares his purpose, saying, for example, "Gentlemen, I sell to you 20,000*l.* at 40;" and the sum is then apportioned among them. If the money were wanted only for a month, and the Exchequer market remained the same during that time, the buyer would have to give 42 in the market for what he sold at 40, being the difference between the buying and the selling price; besides which he would have to pay the broker 1*s.* per cent. commission on the sale, and 1*s.* per cent. on the purchase again on the bills, which would make altogether 4*s.* per cent. If the object of the broker be to buy Consols, the jobber offers to buy his 20,000*l.* at 96, or to sell him that amount at 96¼, without being at all aware which he is engaging himself to do. The same person may not know on any particular day whether he will be a borrower or lender. If he has sold stock and has not repurchased, about one or two o'clock in the day he would be a lender of money; but if he has bought stock, and not sold, he would be a borrower. Immense sums are lent on condition of being recalled at the short notice of a few hours. These loans are often for so short a period, that the uninitiated, who have no other idea of borrowing than that which the old proverb supplies, that "He who goes a-borrowing goes a-sorrowing," would wonder that any man should borrow 10,000*l.* or 20,000*l.* for a day, or at most a fortnight, and which is liable to be called for at the shortest notice. The facilities which the Stock Exchange affords, for the easy flow of capital in any direction where profit is to be secured will explain the mystery.

The directors of a railway company, whose receipts are 12,000*l.* or 14,000*l.* per week, instead of locking up this sum every week in their strong-box, as a premium for the ingenuity of London thieves, authorise a broker to lend it on proper securities. Persons who pay large duties to government at fixed periods, and are in receipt of these duties from the time of their last payment, make something of the gradually accumulating sum by lending it for a week or two. A person whose capital is intended to be laid out in mortgage on real property finds it advantageous to lend it out until he meets with a suitable offer. The great bankers have constantly large sums which are not required for their till, and they direct their brokers to lend this surplus cash on the Stock Exchange. One banker lends about 400,000*l.* to the jobbers on every settling-day. Bankers are also borrowers at times, as well as lenders. The Bank of England sometimes, and also the East India Company, employ their brokers to raise money on the Stock Exchange. Some members of the Stock Exchange call themselves, appropriately enough, "managers of balances." Whatever the market rate of interest may be, it is more advantageous to a capitalist to employ his resources at the smallest rate of profit rather than that it should remain idle. Sometimes the jobber, at the close of the day, will lend his money at 1 per cent. rather than not employ it at all. But the extraordinary fluctuations in the rate of interest, even in the course of a single day, are a sufficient temptation to the money-lender to resort to the Stock Exchange. During the shutting of the stocks money is invariably scarce; but as soon as the dividends become payable, it is again abundant. At other times, on one day the rate of interest will be 10 per cent., and the next day only 2. The rate of interest offered in the morning will also frequently differ from that which can be obtained in the afternoon. Instances have occurred in which everybody has been anxious to lend money in the morning at 4 per cent., when about two o'clock money has become so scarce that it could with difficulty be borrowed at 10 per cent. For example, if the price of Consols be low, persons who are desirous of raising money will give a high rate of interest rather than sell stock. Again, an individual wants to borrow 100,000*l.* on Consols, but they happen to be in great demand, and the jobber may borrow on them at 2 per cent., and lend the very same money on another description of Government security at 5 per cent. The constant recurrence of these opportunities of turning capital is of course the life and soul of the Stock Exchange.

The profit of the jobber, after he has concluded a bargain, depends upon the state of the market, which may be depressed by extensive sales, or by the competition of buyers. These jobbers are middle men, who are always ready either to buy or sell at a minute's notice, and hence a broker, in dealing for his principal, who wants to borrow money, has no need to hunt after another broker, who has money of another principal to lend, but each resorts to the jobber, who is both a borrower and lender. The following information as to the extent of the transactions of a firm of stock-brokers, or, perhaps, more properly speaking, of money-dealers, or, to use the technical phrase, "managers of balances," is official, and may be fully relied on:—"Our business, in addition to that of mere stock-brokers, extends to the dealing in money, that is, borrowing of bankers, capitalists, and others, their surplus or unemployed moneys, for the purpose of lending again at advanced rates, the difference of rate being our remuneration for the trouble and risk attendant thereon. By the general facility thus afforded, from our being almost always ready either to borrow or lend, we have become, as it were, a channel

directly or indirectly for a great portion of the loans between Lombard-street and the Stock Exchange; and the magnitude of our money-dealings will be at once understood when I state that we have both had and made loans to upwards of 200,000*l.* at a time with one house; that the payments and receipts through our banking account on each side amount to eighteen or twenty millions per annum, but our loan transactions far exceed that sum, and extend to the vast amount of from thirty to forty millions a year. Our loans for the year ending October, 1841, exceeded thirty millions, being an average of three millions a month, or 100,000*l.* a day; and generally, upon four or five days in every month, the loans have amounted to 150, 2, 3, 4, 5, and even 700,000*l.* in a single day."

HUDIBRAS.—No. II.

The period from the accession of James I. to the deposition of James II. was one of progressive revolution in England, both in church and state. Elizabeth was the last of our monarchs who was able to exercise anything like arbitrary power, and while the legitimate influence of the middle classes was gradually but surely increasing, the pretensions to kingly power became under James I. and Charles I. the more extravagant, and the exercise of these powers even more absurdly vexatious and annoying than really oppressive. There was unquestionably a growing earnestness among the people in all matters connected with religion; instead of endeavouring to satisfy this feeling, and conduct it in a proper direction, James in the year 1617 published his famous Book of Sports, ordaining what pastimes ought to be used on "Sundays, after evening prayers ended, and upon holidays," bear and bull baitings and bowls being the only sports interdicted, and these only upon such days. That this measure should have revolted many of the serious-minded, whether churchmen or dissenters, was what might naturally have been expected, but it was not till its re-issue by Charles, in 1633, that it developed all the injurious effects it had produced on the cause of royalty. During the interval it, of course, did not escape unattacked or undefended: polemical disputes on this and many similar matters, such as stage-plays and dress, became vehicles for the bitterest personal invectives, and libels, such as those for which Prynne and others of his party were so severely punished, may well explain the irritated feelings of the time,

> "When hard words, jealousies, and fears,
> Set folks together by the ears:"

—words of a more important character than those of the feeble supposition of Dr. Grey, who imagines that Butler alluded to "the cant words used by Presbyterians and Sectaries of those times, such as Gospel-walking, Gospel-preaching, Soul-saving," &c.; nor does Butler imply, nor was it the case, that the "hard words" were all on the side of the Presbyterian party. Unfortunately, the "soft answer that turneth away wrath" was neglected alike by all.

It was the issuing of this Book of Sports that produced or exaggerated the peculiarities of the non-conformists in opposing those customary observances alluded to in the account of Hudibras's religion, which is said to have been "Presbyterian true blue:"

> "A sect, whose chief devotion lies
> In odd perverse antipathies:
> In falling out with that or this,
> And finding somewhat still amiss:
> More peevish, cross, and splenetic,
> Than dog distract, or monkey sick.
> That with more care keep holiday
> The wrong, than others the right way:
> Compound for sins they are inclin'd to,
> By damning those they have no mind to.
> Still so perverse and opposite,
> As if they worshipp'd God for spite.
> The self-same thing they will abhor
> One way, and long another for.
> Free-will they one way disavow;
> Another, nothing else allow.
> All piety consists therein
> In them, in other men all sin.
> Rather than fail, they will defy
> That which they love most tenderly;
> Quarrel with mince'd-pies, and disparage
> Their best and dearest friend plum-porridge;
> Fat pig, and goose itself, oppose,
> And blaspheme custard thro' the nose."

While such a contest was raging, it was inevitable that even good and wise men should differ as to the courses they would pursue. The enthusiastic would promote change in the hope of improvement; the cautious would resist it in the fear of injuring the good they possessed; the rash on both sides were for proceeding to extremities at all hazards; while the selfish and the timid, the knaves and the fools, followed the paths dictated by their interest, their fears, their hopes, or their prejudices. Hudibras and Ralph are ingenious compounds of the whole. Butler was a Conservative; and had probably always been so. He was not of those 'State Converts' he has himself described, "that never left rebellion until it left him;" and his having been a clerk to a Presbyterian justice by no means indicates that he had ever adopted his employer's principles or was guilty of any ingratitude in ridiculing them. He has done this most unsparingly, it is true, but in his 'Remains,' vol. ii, p. 470, 'Thoughts on various Subjects,' we have his more serious opinion, that "All reformations of religion seldom extend further than the mere opinions of men. The amendment of their lives and conversations are equally unregarded by all churches, how much soever they differ in doctrine and discipline. And though all the reformation our Saviour preached to the world was only repentance and amendment of life, without taking any notice at all of men's opinions and judgments; yet all the Christian churches take the contrary course, and believe religion more concerned in our erroneous opinions, than all the most inhuman and impious actions in the world."

In Hudibras and Ralph he has delineated with inimitable wit and force the characteristic defects of the sectarian party—defects, however, from many of which his own side was not altogether exempt. For instance—

> "He was in logic a great critic,
> Profoundly skill'd in analytic;
> He could distinguish and divide
> A hair 'twixt south and south-west side;
> On either which he would dispute,
> Confute, change hands, and still confute;
> He'd undertake to prove, by force
> Of argument, a man's no horse;
> He'd prove a buzzard is no fowl,
> And that a lord may be an owl,
> A calf an alderman, a goose a justice,
> And rooks committee-men and trustees.
> He'd run in debt by disputation,
> And pay with ratiocination.
> All this by syllogism, true
> In mood and figure, he would do."

Such acquirements were certainly not confined to Hudibras's party, nor even to his time. They were the treasures of the earlier schoolmen, inherited by the learned of all parties, and adopted alike by James himself, by the Abbots, by Bramhall the opponent of Hobbes, and others of the orthodox party. The litera-

ture of the age was indeed essentially metaphysical, and Hudibras only resembled a crowd of others in that

> "He could reduce all things to acts,
> And knew their natures by abstracts;
> Where entity and quiddity,
> The ghosts of defunct bodies, fly;
> Where truth in person does appear,
> Like words congeal'd in northern air.
> He knew what's what, and that's as high
> As metaphysic wit can fly.
> * * * * *
> He could raise scruples, dark and nice,
> And after solve them in a trice;
> As if divinity had catch'd
> The itch, on purpose to be scratch'd
> Or like a mountebank, did wound
> And stab herself with doubts profound,
> Only to show with how small pain
> The sores of faith are cur'd again;
> Altho' by woful proof we find
> They always leave a scar behind:"

the last part of the extract containing a truth of universal application.

(To be continued.)

Bees for the Poor.—Many people think the poor may be helped most by giving them small allotments of land. I think this may do much: and I will, whenever I am able, help on this plan. But much difficulty is often found in getting land, and I do not think it is so certain or so safe a way of doing good as by giving a poor man a stock of bees, and then showing him how to take care of them, and to profit by them, for digging is thirsty work, and the beer-shop often stands hard by the allotment; so, although the labourer, after his daily toil, may go by himself to his plot of ground, yet he is very likely to find one or two gardeners, thirsty like himself, to walk toward home with him, but before they get there to drop into the beer-shop; and, when once there, snugly seated in the chimney corner, neither I nor, what is worse, their poor wives, can tell when they will get out of it. But a row of bees keeps a man at home; all his spare moments may be well filled by tending them, by watching their wondrous ways, and by loving them. In winter he may work in his own chimney corner, at making hives both for himself and to sell. This he will find almost as profitable as his bees, for well-made hives always meet a ready sale. Again, his beehives are close to his cottage door; he will learn to like their sweet music better than the dry squeaking of a pot-house fiddle, and he may listen to it in the free open air, with his wife and children about him. They will be to him a countless family. He will be sure to love them if he cares for them, and they will love him too, and repay all his pains.—*Cotton's Bee-Book.*

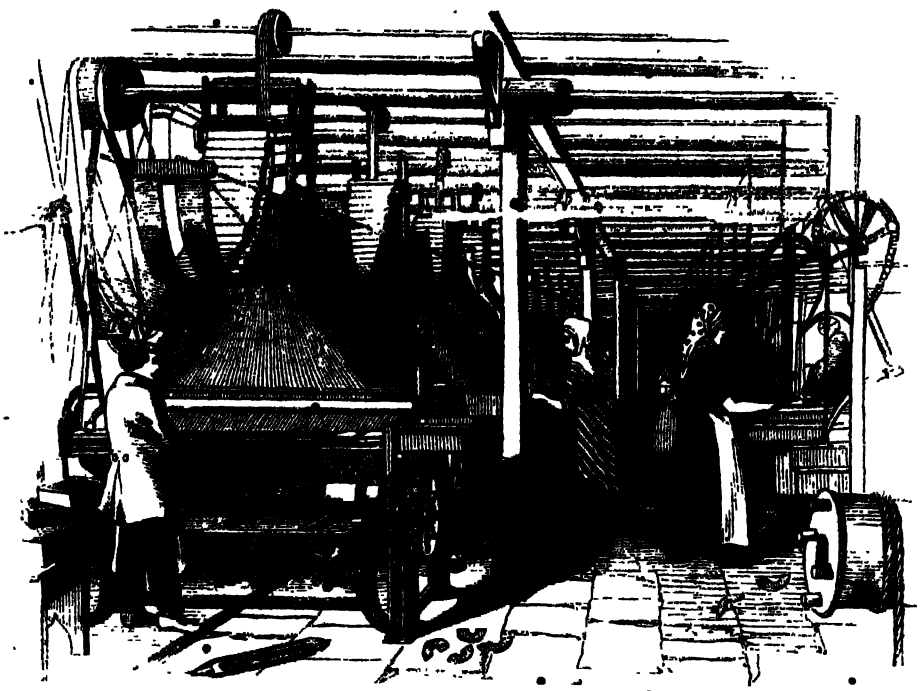
Chinese Ship-Building.—There is another device of the Chinese which is worthy of imitation, and considering the increased security it offers to floating property, and the additional safety of the lives of navigators, it is surprising that it has not been adopted by Americans and Europeans—viz., the division of the holds of ships by water-tight partitions. The Chinese divide the holds of their sea vessels into about a dozen distinct compartments with strong plank, and the seams are caulked with a cement composed of lime, oil, and the scrapings of bamboo. This composition renders them impervious to water, and is greatly preferable to pitch, tar, and tallow, since it is said to be incombustible. This division of their vessels seems to have been well experienced, for the practice is universal throughout the empire. Hence it sometimes happens that one merchant has his goods safely conveyed in one division, while those of another suffer considerable damage from a leak in the compartment in which they were placed. A ship may strike against a rock, and yet not sink; for the water entering by the fracture will be confined to the divisions where the injury occurs. To the adoption of a similar plan in European or American merchantmen, besides the opposition of popular prejudice and the increased expense, an objection might arise from the reduction it would occasion in the quantity of freight, and the increased difficulty of stowing bulky articles. It remains to be considered how far these objections ought to prevail against the greater security of the vessel, crew, and cargo. At any rate, such objections do not apply to ships of war, in which to carry any heavy burdens is not an object of consideration.—*Hydraulic Machinery.*

The Khans of Syria.—Old Maundrell quaintly remarks, "It must be here noted, that in travelling this country a man does not meet with a market-town and inns every night, as in England;" still, at certain intervals of his journey, the weary wayfarer is always sure of falling in with one of these buildings, whose protecting walls at least serve to screen him from the scorching heat of the sun during the day, and from the heavy dews at night. Sometimes, on a much-frequented road, an enterprising speculator will establish himself at one of these khans, and retail to the weary traveller a cup of coffee or a few refreshing whiffs of the bubbling nargihli; but far oftener not even this scanty fare is to be found; and he who journeys in the East must often content himself, after fastening the barley-bag on his horse's nose, to cast himself down on a rug, eat a handful of dates, and court gentle sleep with the soothing chibouque, until the dawn of a succeeding day enables him to resume his journey. To the soi-disant traveller the rugged road, the slow pace of the camel or tired steed, the sandy heat of the desert, or the hard floor of the 'khan,' would present few attractions; only the *real* traveller can enjoy a few such occasional privations.—*Colonel Napier's Reminiscences of Syria.*

Causes of the Decline of Athens.—To the decline of Athens peculiar causes contributed, which I may date from the beginning of the Peloponnesian war. The country being in possession of the enemy, a rural population was crowded into the city, and either thrown out of employment or engaged in pursuits that changed and did not improve their character. Then was the old farmer glad to earn his few obols in the Helima; the stout yeoman became the sentinel of the garrison, or the sans-culotte of the Piræus. Then came the plague, with all its demoralising effects; then the calamities of the war, and the intestine commotions at its close. The wrongs suffered by the people during the interregnum of the oligarchy, and still more by the tyranny imposed by the Lacedæmonians, roused the vindictive feelings of their nature, and kept alive a restless mistrust and jealousy against all men whom, by reason of their wealth, station, or talents, they suspected to be desirous of innovation. Peace and the Commonwealth were restored, but Athens was no longer the same. To recruit her population, thinned by the ravages of war, she had been compelled to naturalize a multitude of slaves and foreigners, whose admixture corrupted her blood, her manners, and her language. A love of shows, festivals, and idle pleasures impaired the courage and industry of the people. This led to the disuse of military service, and employment of mercenary troops; the citizens remaining at home to receive fees and largesses. The Athenian never possessed the stern virtue of the ancient Roman; still, he once had a proud spirit and a high sense of national honour. Now his pride was lowered, his energies enfeebled; and, at the time to which I am carrying the reader, Athens tottered to her fall; Phocion despaired of his countrymen, and Demosthenes was unable to preserve them.—*Kennedy's Demosthenes.*

Causes which led to the belief in Alchemy.—The conduct of the scientific alchemists of the thirteenth, fourteenth, and fifteenth centuries presents a problem of very difficult solution. When we consider that a gas, a fluid, and a solid may consist of the very same ingredients in different proportions; and a virulent poison may differ from the most wholesome food only in the difference of quantity of the very same elements; that gold and silver, and lead and mercury, and indeed all the metals, may be extracted from transparent crystals, which scarcely differ in their appearance from a piece of common salt or a bit of sugar-candy; and that diamond is nothing more than charcoal—we need not greatly wonder at the extravagant expectation that the precious metals and the noblest gems might be produced from the basest materials. These expectations, too, must have been often excited by the startling results of their daily experiments. The most ignorant compounder of simples could not fail to witness the magical transformations of chemical action; and every new product must have added to the probability that the tempting doublets of gold and silver might be thrown from the dice-box with which he was gambling. But when the precious metals were found in lead and copper by the action of powerful re-agents, it was natural to suppose that they had been actually formed during the process; and men of well regulated minds even might have thus been led to embark in new adventures to procure a more copious supply, without any insult being offered to sober reason or any injury inflicted on sound morality.—*Sir D. Brewster's Martyrs of Science.*

A DAY AT THE YORKSHIRE WORSTED-FACTORIES.



[Jacquard Weaving-Shed.—Akroyd's Worsted-Factory.]

OUR present "Visit" will partake somewhat of a rambling character. It has on a few occasions happened that, as a means of affording a little information concerning any particular branch of manufacture, we have found it desirable to extend our observations beyond the walls of one factory, and to glance round the circumstances and arrangements which give to an entire district the character of one great workshop. It is often only thus that the bearings and mutual dependence of different trades can be properly appreciated. The "Day at a Leeds Woollen-Factory" has enabled us to glance at the general operations connected with the manufacture of *felted* or *fulled* wool; and we will now see what the West Riding of Yorkshire exhibits in respect to the manufacture of *worsted* goods; using the term worsted as applying to all wool which is not fulled after being woven.

It is very probable that many of the woven fabrics now made into dresses, and called by various fanciful names, although really made only of worsted, or of worsted mixed with cotton, may not be generally known as coming under the denomination of *worsted* goods. The trade-list of a large worsted-factory at Halifax contains the following enumeration:—'3-4 Lastings, 3-4 Fancy Lastings, 3-4 Crapes, 3-4 Serge, 3-4 Orleans, 6-4 Orleans, Cassimets, 3-4 Twills, 3-4 Linings, 4-4 Dobbies, 6-4 Dobbies, 6-4 French Figures, Alpaca, 3-4 Parisians, 6-4 Parisians, 3-4 Damasks, 6-4 Damasks, 3-4 Camlets, 4-4 Camlets, 5-4 Camlets, 6-4 Camlets, 5-4 Plainback, 6-4 Plainback, 7-4 Plainback, 6-4 Merino, Say Plainback, 5-4 Says, 3-4 Princettes.' Now all these goods are made either of worsted alone or of worsted mixed with cotton; none of them having undergone that peculiar process of fulling which forms the chief characteristic of woollen goods. There are also numerous forms in which worsted fabrics (or others in which either silk or cotton is combined with worsted) are prepared for sale, not included in the above list; such are those called 'Challis,' 'Mousseline-de-laines,' 'Fancy Waistcoatings,' 'Paramattas,' 'Shalloons,' 'Duroys,' 'Taminets,' 'Calimancoes,' &c. If all the kinds were enumerated, it would probably be found that in some instances the fabrics have gone or are going out of date, and that in other instances two names refer to the same material; thus, 'plainback' is a manufacturer's appellation for a kind of worsted stuff known by some other name by retail purchasers. There are two kinds of goods, in which worsted is mixed with silk, that afford remarkable instances of the tendency in manufactures to become located in particular districts; 'Poplins' being an Irish manufacture, and 'Bombazeens' a Norwich product, and neither of them being made to any considerable extent elsewhere.

The rapid extension of the worsted manufacture in this country is very remarkable. So long as efforts were made by English wool-growers to compel the use of English wool in cloth-making—efforts which the legislature for many years sanctioned by legal enactments—the worsted fabrics made were chiefly of a coarse and heavy kind, such as 'Camlets;' but when the wool-trade was allowed to flow into its natural channels, by the removal of restrictions, the value of all the different kinds of wool became appreciated, and each one was appropriated to purposes for which it seemed best fitted; foreign wool became mostly in demand for woollen-cloth, the wool of one kind of English sheep continued in demand for hosiery and heavy worsted goods, a fine long wool from a new breed of English sheep became sought after as a material for fine worsted goods, and the wool of the Cashmere and Angora goats became imported for simi-

lar purposes. A glance at our exports will show how largely the production and sale of worsted goods have been increased under the operation of these circumstances; for the exportation of worsted stuffs, which in 1821 amounted to 828,824 pieces, rose by the year 1841 to 1,718,617 pieces; while the mixed goods of worsted and cotton, which in 1821 were exported to the extent of 407,716 yards, rose by 1841 to 3,628,874 yards.

Formerly, the manufacture of cloth for sale had been exclusively confined to cities and corporate and market towns, the inhabitants of the villages and hamlets making little more than sufficed for the use of their respective families. But the towns could now no longer exercise their domination over trades to its former extent; and a numerous body of industrious men were gradually rising into importance who resided out of the towns, —"foreigners," as they are termed in the statutes, or "persons dwelling in the small towns of husbandry." Many of them were husbandmen or graziers, who made their own wool into cloth, with the assistance of their wives and families. The sorting of wool was performed by women. The cloths made out of the towns were generally of a coarse description; and, if we may believe various authorities, the country clothiers were not very strict in maintaining the assize, which fixed the length and breadth of each piece. The condition of some of these manufacturers was humble enough. Many of them were only enabled to buy their wool in small quantities, as "eight pennyworth and twelve pennyworth at a time," and therefore could not make their purchases of the wool-grower. A statute, passed in 1551 and 1552, which prohibited wool being bought except by the persons intending to use it themselves in the manufacture of cloth, did away with the intermediate dealers in wool, whose existence was of essential importance to the small clothiers; but it was eventually found necessary to make some relaxations on their account, so that wool might be bought by dealers and sold again in the open market. The clothiers of Halifax were relieved from this inconvenience in 1555, by an Act enabling the inhabitants of that town "to buy wool, and retail it to poor folk to work, but not to the rich and wealthy, nor to sell again." The preamble of this statute describes, with considerable minuteness, the circumstances of the humbler class of country clothiers, and supplies details of some interest of the manner in which they carried on their trade. It recites that "the parish of Halifax and other places thereunto adjoining, being planted in the great wastes and moors, where the fertility of ground is not apt to bring forth any corn or good grass, but in rare places, and by exceeding and great industry of the inhabitants; and the same inhabitants altogether do live by cloth-making, and the great part of them neither getteth corn, nor is able to keep a horse to carry wools, nor yet to buy much wool at once, but hath ever used only to repair to the town of Halifax, and some other nigh thereunto, and there to buy upon the wool-driver, some a stone, some two, and some three or four, according to their ability, and to carry the same to their houses, some three, four, five, and six miles off, upon their heads and backs, and so to make and convert the same either into yarn or cloth, and to sell the same, and so to buy more wool of the wool-driver; by means of which industry the barren grounds in those parts be now much inhabited, and above five hundred households there newly increased within this forty years past, which now are like to be undone and driven to beggary, by reason of the late statute made that taketh away the wool-driver, so that they cannot now have their wool by such small portions as they were wont to have; and that also they are not able to keep any horses whereupon to ride or set their wools farther from them in other places, unless some remedy may be provided."

At a later period Flemish clothiers were invited over, many of whom are supposed to have settled at Halifax; and there is said to be, even to the present day, a strong resemblance between the dialect of the labouring classes there and at Friesland in Holland,—a resemblance which has given rise to the following rather odd distich:—

"Goold brade, botter, and cheese,
Is goold Halifax, and goold Friese."

The introduction of these Flemish clothiers into England is detailed by Fuller, in his 'Church History' (1655), in a very quaint manner. He justifies his enter- on such topics in a work apparently unsuited for them, on the plea that they "reductively belong to the Church History,' seeing many poore people, both young and old, formerly charging their parishes, were thereby enabled to maintain themselves." After expressing strong contempt for the skill of the clothiers before Edward III.'s time, as "knowing no more what to do with their wooll than the sheep that weare it, as to any artificial and curious drapery, their best cloth being no better than freeze, such their coarseness for want of skill in their making;" Fuller proceeds to state that on the marriage of King Edward to the daughter of the Earl of Hainault, the intercourse between England and the Netherlands being thereby greatly increased, the king had facilities for introducing Flemish clothiers into England. Fuller, on what authority he does not say, states that the Flemish clothiers used their workmen and apprentices "rather like heathens than Christians, yea, rather like horses than men, early up and late in bed, and all day hard work, and harder fare (a few herrings and mouldy cheese)." He then contrasts the bright prospect which opened on these ill-used operatives:—"But, oh! how happy should they be, if they would but come over to England, bringing their mystery with them, which would provide them welcome in all places. Here they should feed on fat beef and mutton, till nothing but their fulnesse should stint their stomachs; yea, they should feed on the labours of their own hands, enjoying a proportionable profit of their gains to themselves; their beds should be good, and their bed-fellows better, seeing that the richest yeomen in England would not disdain to marry their daughters to them, and such English beauties, that the most curious foreigners could not but commend them." The result of this immigration he narrates in no less glowing colours:—"Happy the yeoman's house in which one of these Dutchmen did enter, bringing industry and wealth along with them. Such as came in strangers within doors, soon after went out as bridegrooms and returned sons-in-law, having married the daughters of their landlords who first entertained them; yea, those yeomen in whose houses they harboured, soon proceeded gentlemen, gaining them estates to themselves, arms and worship to their estates."

Whether or not this golden picture is to be accepted with implicit faith, it is certain that the use of English wool in home manufactures became from that time more and more extensive, Halifax being at first the centre of the Yorkshire product, and the division not being then so much marked as now between worsted and woollen goods.

If we station ourselves at Bradford, as a centre, we shall find that our position is in the heart of the clothing districts; a number of busy towns and villages, almost too numerous to specify, lying on all sides of us, and all occupied chiefly by cloth and stuff makers.

Bradford lies at the junction of three fine valleys, having the important towns of Leeds, Wakefield, Dewsbury, Huddersfield, Halifax, and Keighley almost equidistant from it. This is one of the many towns which, when approached just after dark on a winter's evening, present that curious species of illumination resulting from the countless windows of large factories. Five, six, seven stories of such windows are to be seen, extending to great width, and each throwing out its glare from the gas-lights within the long rooms or galleries of the factory. Those who, by residing in an agricultural county, or even in London, are not accustomed to such a sight, can scarcely form an idea of the singular effect which these symmetrical specks of light produce when viewed in the aggregate from a distance. The recent extension of the worsted manufacture has done great things for Bradford; it may now be deemed the centre of the worsted trade, inasmuch as there is more worsted yarn spun here than at any other town in the kingdom. Not only, indeed, do many of the worsted and stuff manufacturers of other towns in the West Riding procure their yarn from Bradford, but even the shawl-weavers of Paisley do the same; and we believe that many of the bombazeen-weavers of Norwich are beginning to act on the same plan. The abundance of cheap coal, the vicinity of numerous towns where worsted yarn is required, and easy communication with nearly all the great towns in the kingdom, are probably the causes to which we may attribute the formation of this flourishing state of things. There are at present more than one hundred firms at Bradford carrying on the occupation of worsted-spinners; some combining with it that of stuff-manufacturers. This congregation of worsted-spinners requires that a large and constant supply of wool should be at hand; and thus wool-staplers or wool-dealers have settled at Bradford. Then, again, the large supply of wool thus procured having made Bradford a kind of market, the spinners from other towns have gone thither to make their purchases; this in its turn has induced other woolstaplers to locate there; until at length by these successive steps Bradford has become the great wool-market of England, to which attention is always directed by those concerned in the price, quality, supply, and demand of wool. These woolstaplers make very large purchases of wool, not only from the English sheep-farmers, but from Prince Esterhazy and from other extensive wool-growers all over the world. There is a 'Stuff-Hall' in the town, consisting of a spacious building one hundred and forty-four feet long by thirty-six broad, and two stories in height, in which manufactured stuff goods are exposed for sale on market-days.

If we next go in a north-west direction from Bradford to Keighley, we pass through numerous clothing villages scattered along the ten miles of road, and come to a town of rising importance, which serves as a centre to many of these villages. There is a considerable number of worsted mills in Keighley parish, and numerous hand-loom weavers, working on woollens, linseys, and worsteds. Keighley, however, does not rank with Bradford or Halifax; for instead of having a cloth or piece hall of its own, its productions are sent to one or other of those two towns for sale at the piece-halls, and often pass through the hands of the Leeds merchants to the foreign customers.

Turning to the south-west of Bradford, we find Halifax, at a distance of seven or eight miles, a town more closely connected with clothing manufactures in early times than any other in Yorkshire. Its situation and appearance are very remarkable. It is placed on the western declivity of a gentle eminence; but being surrounded by hills of considerable elevation, it appears, on approaching it, to stand in a deep valley. The road from Bradford is a succession of hill and valley; and a traveller sees nothing of Halifax until he surmounts the hill at its eastern margin, when the whole town becomes suddenly mapped out before him in a valley beneath, with factory chimneys shooting up in every direction. A river runs through the town at the bottom of the hollow, and is so hemmed in by factories on both sides, that we can scarcely see either the width of the stream or the colour of its waters. At Halifax we find the two great divisions of woollen and worsted manufactures more equally divided than at any other of the clothing towns. There are woollen cloth manufacturers, woollen and worsted printers, woolstaplers, worsted spinners, stuff manufacturers having factories in the town, and stuff manufacturers who only attend the Piece-Hall on market-days. This Piece-Hall is the finest in the kingdom. It is a large freestone edifice, occupying an area of ten thousand square yards, and divided into three hundred and fifteen apartments, where the goods are exposed for sale. There have been frequently fifty thousand pounds worth of woollen and worsted goods exposed here for sale at once; but it is understood that the factory system of production is gradually lessening the amount of sales effected at the Hall. The kind of worsted stuff called *shalloon* has been a great staple at Halifax, it having been computed some years ago that ten thousand pieces of this material were annually made there, mostly for Turkey and the Levant.

Huddersfield is about as far from Halifax as Halifax is from Bradford, and is, like it, a busy clothing town, and the centre of a cluster of clothing villages. It is at Huddersfield that we may look, more perhaps than at any town except Bradford, for evidence illustrating the recent spread of the worsted manufacture. Although there is a large number of firms there engaged in the woollen cloth manufacture, just as at Leeds, and although the Piece-Hall affords a market to a great extent of clothing district around, yet 'fancy goods' may be deemed the chief feature presented by the Huddersfield manufactories at present. These fancy goods are such as are termed 'waistcoatings,' and the like, or fabrics of worsted, worsted and cotton, or worsted and silk, in which there is a pattern of some kind or other worked by the loom, different coloured yarns being employed. There is an astonishing number of firms at Huddersfield engaged in this kind of fancy-worsted work, besides a still larger number, residing chiefly at Honley and other towns and villages in the vicinity, who only attend Huddersfield market on Tuesdays. When it is considered that Huddersfield was very insignificant both in trade and population until the beginning of the last century, its present position appears the more striking, and is principally to be traced, like that of Halifax, to its admirable local advantages. The Piece-Hall is a remarkable building, being an extensive circular range, two stories high, with a diametrical range one story high, dividing the internal area into two semicircles. The light is wholly admitted from within, there being no windows on the outside; and it thus partakes somewhat of the character of the *caravanserais* of the East. The hall is subdivided into streets, which streets consist of rows of stalls, such as in the two cloth-halls at Leeds; and six hundred country manufacturers frequently attend here on market-day.

If we go westward from Huddersfield to Saddleworth, Rochdale, or any of the towns and villages in that vicinity, we find manufactures to be in a curious position with respect to the two great staples, wool and cotton. Lancashire may be termed a cotton county. Yorkshire a woollen county; and the towns here named, being near the borders of the two counties,

present a mingled assemblage of these two departments of productive industry. Thus at Saddleworth there are cotton manufacturers, cotton spinners, cotton waste dealers, and others, connected with the one department; and woollen cloth manufacturers, woollen cloth printers, woollen millers, wool-staplers, cloth-dressers, and flannel manufacturers, connected with the other. At Rochdale, again, there are the two kinds; but here a remarkable difference is observable, for which it does not seem very easy to account. Although Rochdale is not far from Saddleworth, and both have cotton factories of various kinds, yet in respect to wool, Saddleworth is almost wholly limited to woollen cloth, while Rochdale is chiefly distinguished for flannels and baizes. So singularly has this last-named manufacture settled at Rochdale, that there are nearly a hundred and fifty "manufacturers of flannel and baize" in the town; and it has become the centre whence all the home and foreign markets are supplied with Yorkshire flannels.

Eastward of Huddersfield we meet with two towns which present yet another feature of the clothing district, viz. the manufacture of *blankets*. These articles, in many details of their manufacture, are distinct from the flannels of Rochdale, the stuffs of Halifax, the fancy-goods of Huddersfield, or the cloths of Leeds; and their production and sale have gradually centred at a particular spot. Dewsbury and Heckmondwike are the two towns here alluded to, both lying in the road from Halifax to Wakefield. Nearly all the manufacturers in these two towns are engaged in the blanket-trade; and there is also a 'Blanket-Hall' at the latter place, where the Leeds merchants make their purchases for the home and foreign markets.

When we have touched at Wakefield, and gone thence northward to Leeds, we shall have made the tour of the very remarkable "clothing district" of the West Riding. Wakefield, considered as a clothing town, has fallen from its once high position: it has been superseded by other towns. Leeds, Halifax, and Wakefield were once the three great centres: the two former still retain their eminence; while Wakefield has given way, and Bradford and Huddersfield have risen to distinction. In Leland's time we are told that "Wakefield standeth now al by clothying;" and at a later period woollen cloth, stuff goods, and worsted yarn were the main products of the place; but now, although there are still woollen and stuff manufacturers in the town, the number of them bears but a small proportion to those in the other towns we have named. The wool-market, too, is gradually leaving Wakefield for Bradford. Wakefield, on the other hand, has greatly risen as an emporium for the corn and malt trade, and also as a cattle and sheep market; so that the prosperity of the town has not declined, it has merely taken a different direction.

We have thought it desirable to give this rapid sketch of the clothing district generally; for the worsted manufacture, taken in its widest sense, cannot be understood without noticing the subdivisions to which it is subjected, and the tendency which each branch has to centre itself in some particular spot. There is a feature observable, too, in this district, which we do not remember to have seen noticed by any writer; that is, the prevalence of particular *names* among the manufacturers. The domestic system of manufacturing, which was for many generations the one followed in Yorkshire, led naturally to children being brought up to the same occupation as that pursued by their parents. There were many parts of the process which boys could perform, and these boys thus learned by degrees the trade of their parents, especially when all this was done under the father's roof. Added to this, a certain fixity of habits and tastes, the absence of a tendency to roam, has caused the same family to remain in the same spot for one generation after another. Whether we have rightly explained the cause, it is certain that this recurrence of names among the manufacturers is very observable. If we take that curious record of personal statistics, a 'Directory' of Yorkshire, we shall have the means of testing this. From such a volume, published a few years ago, it will be perceived that there is hardly a town in the clothing district which has not got its Akroyd, Ackroyd, or Akeroyd, among the woollen or worsted manufacturers, the name being spelt in all three different ways. Among the woollen manufacturers at Huddersfield are seven Croslands, six Crowthers, seven Haighs, six Schofields, eleven Shaws, eleven Sykeses, and so forth. At Saddleworth it is yet more remarkable; for here there are recorded, as distinct manufacturers of woollen cloth, six Bottomleys, fifteen Bradburys, seventeen Broadbents, thirteen Buckleys, seven Kenworthys, eight Rhodes, eleven Schofields, eleven Shaws, eleven Whiteheads, and nine Wrigleys. Similar repetitions of the names Ashworth, Butterworth, Clegg, Schofield, and Whitworth occur among the flannel manufacturers at Rochdale; as also those of Bailey, Blakeley, Brearley, Day, Hirst, Newsome, Senior, and Sheard, among the drugget manufacturers of Dewsbury; and of other names among the blanket manufacturers of Dewsbury and Heckmondwike. It is not unworthy of remark that these recurrences of similar names are not nearly so much observable among the *worsted* as the *woollen* manufacturers, the latter having been more associated than the former with the domestic system of manufacturing.

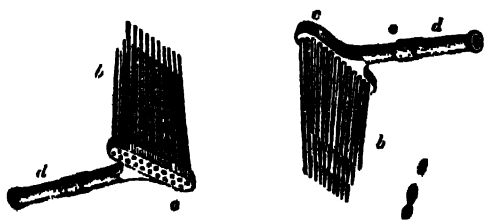
Whatever be the kind of worsted fabric about to be manufactured—and that there are many such, our list on a former page will sufficiently indicate—the wool is first brought into the state of worsted yarn; and we may now shortly describe the mode in which this is effected, so far as that differs from the spinning of the woollen yarn described in our November Supplement.

The wool employed for worsted is always longer than for felted woollens, and generally coarser; and the processes which it undergoes, so far from being calculated to make the individual fibres lock into each other by the little serrations on their surfaces, are intended to facilitate the production of a fine, even, and smoothly spun thread. Indeed it is one object of the processes preparatory to the spinning to impair the felting property of the wool.

The wool is very carefully washed before being fitted for worsted work. The washing is effected with soap and water, the greater part of the moisture being afterwards pressed out by rollers. The wool, after washing, is carried to a drying-room, where it is spread out on the floor to dry. In most modern factories or mills where wool is thus prepared, matters are so arranged that the drying-room shall be immediately over the boiler-room belonging to the steam-engine; so that the heat of this lower room, which would otherwise be wasted, is usefully employed in imparting warmth to the drying-room. When the wool is dried, it is passed through a machine called a *plucker*, consisting of a pair of spiked rollers fed by an endless apron. By the revolving spikes of this machine the fibres of the wool are cleansed and straightened, preparatory to the next process. This 'plucker' is generally attended, or 'tented,' to use a factory phrase, by a boy of twelve or fourteen years of age, whose business is to lay the tufts of wool pretty evenly on the endless web or apron which acts as a feeding-cloth.

The wool is next ready for *carding*, or *combing*, according to the fineness and quality of the worsted to be made from it. The process of combing the wool is sometimes performed with apparatus so simple, that

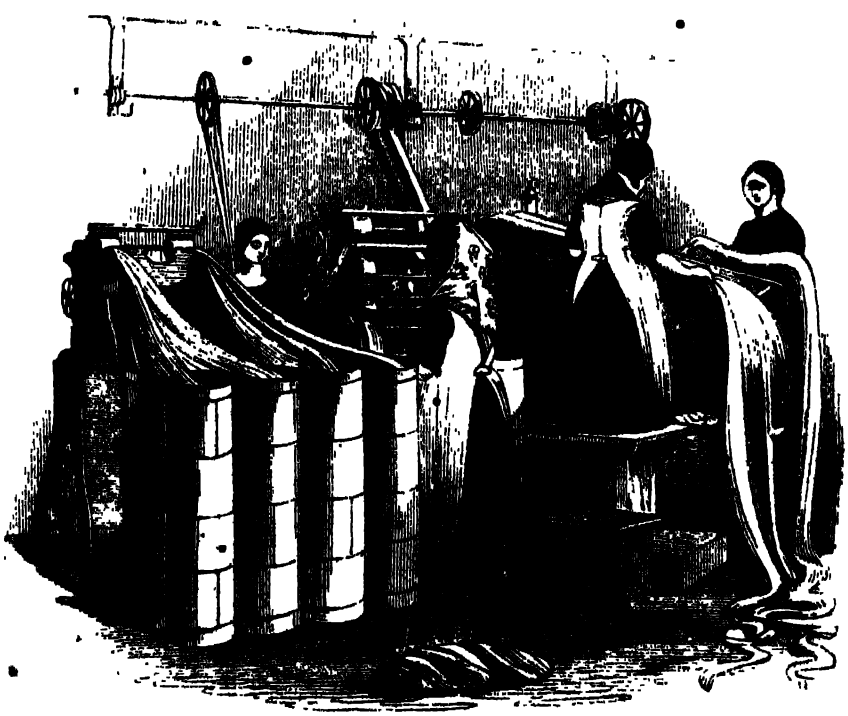
the workman can carry it on at his own house; while at other times it involves the complexity of factory machinery. A very large quantity of the wool used around Halifax and Bradford is hand-combed; indeed, all the wool-combing machines yet invented are said to have failed in respect to the working of *fine* worsted, although they are well adapted for the coarser qualities. The hand-comb consists chiefly of a piece of wood shaped something like the letter T. Through the head or transverse part of it, which is generally about three inches broad, a number of very long sharp teeth are thrust. These teeth, which are made of well-tempered steel, are finely tapered, and are generally arranged in three rows, about thirty in each, placed nearly at right angles to the face of the wood. The angle of the comb is represented by the perpendicular part of the T, as in the annexed cut, where *b* are the teeth, *c* the head or stock into which they are fixed, and *d* the handle. In using this instrument, the wool is carefully flung upon the teeth, in such a manner as to project over the front of the head, and when sufficiently filled and firmly fixed, another comb of the



same kind is drawn through the wool, so as to unravel and lay all the fibres smooth and even. Mr. Luccock, while describing this process, aptly remarks: "If we consider the full comb as the human head, disgraced by a quantity of neglected, long, and dishevelled hair, which we reduce to its elegant order, we shall have a very just idea of the operation and use of this instrument in the worsted manufacture. The very name shows its origin, application, and use." This process of hand-combing is very laborious, and is generally carried on in rooms which are close and hot, arising from the presence of stoves for heating the combs. If the combs were cold when used, the woolly filaments would not acquire the necessary pliancy and ductility, and the teeth of the comb are therefore heated in a stove. The stove usually consists of a flat iron plate, heated by fire or by steam, and surmounted by another plate to confine the heat; and into the small space left between the two plates the teeth of the comb are introduced. A considerable quantity of oil is employed in the combing process, and this renders the process rather a dirty one. There is a kind of knotted portion of all the fibres left uncombed, on account of the teeth of the comb not being able to reach it: and this, under the name of *noyl* or *noil*, is afterwards carded and spun into coarse woollen yarn.

Dr. Cartwright, whose mechanical inventions have been recorded in the recently published 'Memoirs' of that ingenious man, invented a machine for combing wool; and since his time many others have been invented, of which one consists mainly of two large wheels, ten feet in diameter, having teeth at their peripheries so placed as to comb out the wool. Whenever such machines are used, the wool leaves them in the form of a continuous *sliver* or riband.

Considerable change has recently been introduced into the worsted trade by the substitution of *carding* for *combing* the wool. In this instance the fibres of wool are straightened and laid parallel, somewhat in the same way as the cotton in cotton-carding. By this mode of proceeding, the *noyl* of long fleece-wool and a great deal of skin-wool, which used to be employed only in blanket and coarse woollen work, can now be worked up into coarse worsted yarn; and the price has been so lessened by the change, that nearly all



[Drawing the Worsted into Slivers.]

coarse worsted yarn is now produced by carding. Mr. Bischoff, in his 'History of the Wool-Trade,' mentions a circumstance connected with the origin of this improvement, which shows the imperfect state of our present patent-laws:—"The application of the cotton process was patented by Mr. William Lister of Halifax. A somewhat similar plan was also about the same time adopted by Messrs. Haddens of Aberdeen; both parties considered their individual patents invaded, and eventually brought actions against each other, the result of which was, that both were thrown open to the public on the same day, whereby the patentees were never able to realize the fruits of their industry." The process of carding is one of those that have led to the vast increase in the production of worsted goods within the last few years; for wool to be hand-combed must have not less than six inches length of fibre, whereas carding can be applied to the *noyl* and all the short fibres. The system of sheep-farming, too, recently followed, has had the effect of giving to the English fleece very long wool, so that all the wool now grown in England can be spun into worsted yarn of one kind or other; while the woollen-cloth manufacturer is well content to have his supply of felting wool from foreign sources—circumstances which, combined, have placed the wool-trade on a more healthy footing perhaps than at any former period.

The chain of processes whereby the fibres of wool are wrought up into worsted yarn, occupies a medium place between the preparation of cotton yarn and of woollen yarn; it partakes of both, and is yet somewhat different from either. A very brief sketch of these processes will here suffice, after what has been given in former numbers.

In the large establishment of Messrs. Akroyd, at Halifax—one, indeed, among several establishments owned by the same firm in and near that town—we witnessed the process of worsted manufacture, not from the commencement, but from the state of 'sliver.' The worsted prepared being generally for the finer fabrics, the hand-combing process is still the one generally employed; and this being what we may term a domestic process, or a species of handicraft, may be carried on at the houses of the workmen. The number of workmen so employed in and around Halifax and Bradford is very large, the firm above mentioned giving employment, in brisk times, to several hundreds of them.

The wool comes to the factory in narrow bundles or 'tops,' about eighteen inches long, and weighing about a pound and a half or two pounds each. These 'tops' are taken to one of the upper rooms of the factory, filled with the machines for 'drawing' and otherwise preparing the worsted; such as are represented in the cut on the preceding page. Each top is first opened, and the wool laid upon an endless band, which carries it between drawing-rollers, whereby it is elongated, ranged parallel, and conveyed into a cylindrical can as a delicate kind of riband. This riband is transferred from one machine to another, and drawn between rollers so repeatedly, that, like the rod of metal in wire-drawing, it becomes gradually reduced in thickness, until it assumes the form of fine cord, or 'roving,' ready for the spinning-frames.

The spinning is effected in a different range of workshops, but by machines analogous in principle to those employed in other branches of textile manufacture. The quality of the yarn produced, and the mode of spinning it, depend of course on the purpose to which it is to be applied. Thus, for 'mousseline-de-laine,' or for 'challis,' a fine and soft worsted yarn is required; whereas for 'camlet,' and other stout goods, a stronger and thicker yarn is essential. The warp, too, of almost all kinds of goods is made from yarn rather different from that employed in the weft. It has been made a matter of calculation among the spinners at the factory above noticed, that they spin enough 'weft' yarn every day to reach from London to New Zealand. In one of the lower warehouses of the factory, we saw vast piles of the yarn thus prepared, made up into bundles, and ready to be used by the weavers within the same factory, or for sale to other manufacturers. There are dye-works belonging to the firm in another part of Halifax, where the worsted is dyed before or after weaving, according to the nature of the fabric; and there is also a process of warp-scouring effected in a certain stage of the manufacture.

Some parts of the processes connected with the spinning require that the worsted shall be in a damp state. This is effected in a curious manner. In one of the rooms of the factory are a number of tin boxes, perforated on all sides. The wool is put into these boxes, and the boxes themselves are placed in a large chest connected with the receiver of an air-pump. The air is exhausted from the chest, which necessarily involves



[Warp-Scouring.]

the exhaustion of the air from between the fibres of wool contained in the perforated boxes. Water is next admitted, and then the air is re-admitted, by which the water is instantly forced between all the fibres, so as to saturate every individual fibre equably and completely.

All the processes incident to the arrangement of the yarn for the loom are carried on in the usual way; such as the 'warping,' the 'beaming,' and the 'drawing-in' of the warp, and the 'winding' of the weft. It is, however, worthy of remark, that modern improvements have been introduced for spinning weft on the very 'spools' which are afterwards to be used in the shuttles, so as to get rid of the after-process of 'winding.'

We next descend to the 'weaving-shed,'—a building not only the most remarkable connected with the factory, but one which is particularly calculated to illustrate the rapid progress made in the worsted manufacture within the last few years. Here we find eight hundred and forty power-looms in one room, all working at once in the production of merinos, damasks, camlets, lastings, Paramattas, Orleans, Parisians, cassinets, and the host of worsted or stuff goods now made. But this is not the only observable feature. There are cotton



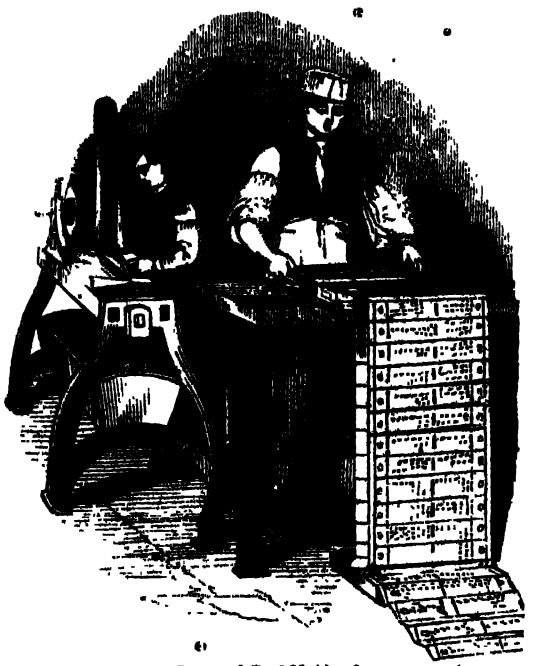
['Drawing in' the Worsted Warp for Weaving.]

factories in Lancashire and Cheshire which can boast of a yet larger number of power-looms, amounting in some instances to fifteen hundred; but in such cases the weaving is nearly always of a simple kind, consisting of plain fabrics, such as calico or twills, figured devices, if introduced at all, being very sparingly effected by the power-loom. In worsted weaving, however, the application of the power-loom has been most remarkable; and there is an observation on this point in Mr. Bischoff's 'History' which may be appropriately introduced here. After speaking of the use of the *Jacquard* machine in silk weaving, Mr. B. remarks:—"Until the introduction of this machine, the production of the superior figured silks depended wholly on the skill of the weaver, and that to a degree which few attained; the necessity of extreme carefulness and skill is now considerably diminished; in other words, the production of the most costly fabrics is laid open to a large number of operatives. The Jacquard engine may be attached to almost any loom, and is generally owned by the manufacturer, and is furnished to the weaver with the warp. These looms were introduced into Yorkshire in the weaving of figured and flowered stuffs, by the late Mr. James Akroyd, of Halifax. The manufacture of moreens was also brought there by him and his brother, Mr. Jonathan Akroyd; they next imitated the article of cotton jeans, in worsted, with success, to which they gave the name of 'plainbacks,' out of which has sprung that immense and valuable branch of 'merinos.' They also introduced the mode of weaving stuff damasks, and were the first to use the Jacquard engine in Yorkshire." The allusion here to the custom followed between the manufacturer and the Jacquard-weaver relates to hand-loom weaving only, power-weaving being conducted wholly and necessarily on the factory system. In the magnificent room where these eight hundred and forty power-looms are at work (for it may be called magnificent in relation to the mind, the mechanism, and the capital there represented), are looms producing almost every variety of complex texture known to the weaver. In some there are no fewer than thirty-two 'heddles,' or systems of strings by which the warp-threads are drawn up to admit the shuttle, and yet all are worked by steam-power; one person, generally a female, being required merely to tend the machine and make a few adjustments, the steam-engine doing all the work. In other instances the exquisite "Jacquard" machine, one of the most complete of all mechanical inventions, is fitted to the top of the loom, where it regulates the raising of the warp-threads so as to lead to the production of figures having almost an exhaustless variety of size and form.

We have in two or three former papers had to speak of the Jacquard machine as being in use in textile manufactures; but we have not described the mode in which the *cards* are made. These cards are slips of pasteboard (or sometimes of tin) from one to two feet in length, and two or three inches wide, each card perforated with a great number of holes about a quarter of an inch in diameter. For the production of any particular pattern there must be as many cards as there are weft threads in the pattern: for instance, if the pattern consisted of a flower, the full space of which occupied two hundred weft threads, or required that number of weft threads to represent it, then there must be two hundred cards prepared for that one pattern, all of the same size, and all pierced with holes. But the holes thus pierced are not alike in number in the different cards; in some there may be twenty holes, in some fifty, and in others a number greater or smaller than either of these; and the determination of these numbers is a very singular part of the arrangement. The pattern is drawn on a piece of paper intersected by black cross-lines, to represent the warp and weft threads. A man or boy has before him a row of strings to represent some of the warp threads, and into and among these he passes a cross-thread to represent one row of weft, passing it above and below according to the pattern. By this means he divides his imitative warp-threads into two parcels, analogous to the raised and depressed portions of the real warp when in the loom; and these two portions are so far represented on the punched cards, that the raised warp threads are connected with the holes in the cards, while the depressed threads are connected with blanks or uncut parts of the card. The boy's row of threads are attached to an ingenious machine, whereby several punches are passed through holes in a leaden plate, the number and disposition of the holes depending on the pattern; and a piece of cardboard being then placed beneath these punches, a machine something like a cylinder-press presses all the punches upon the cardboard, and punches the holes. The best description we have seen of the process of Jacquard card-making is by Mr. Porter, in his 'Treatise on the Silk Manufacture;' but we have not room to give details at greater length: suffice it to say, that the disposition of the holes in each card depends principally on the nature and size of the pattern in the direction of the weft; that the number of cards depends on the pattern in the direction of the warp; that the cards for one pattern frequently amount to four, six, or eight hundred; that all are connected in an endless chain when attached to the loom, and that each set of cards will be available for one pattern only. Adjoining the card-making room, at the factory, is a room where the pattern cards are preserved, each set tied up in a bundle, and numbered for future use. An instance was once afforded at this establishment, probably as a trial of skill in fancy worsted weaving, in which the enormous number of *eleven thousand* cards were used in producing one pattern. What has been the highest number ever employed with the

Jacquard we do not know; but in some few instances complete pictures have been thus produced; and we have seen, at an exhibition of works of art in the Mechanics' Institution at Leeds, a beautifully distinct fac-simile of the will of Louis XVI. entirely woven by the Jacquard machine.

To return to the weaving-shed. The large size of many of the looms for weaving fancy goods, especially those in which the Jacquard apparatus is employed, gives to this room an extremely busy appearance, much more so, indeed, than that presented by the power-loom weaving-galleries in the cotton manufacture, where the looms are very much smaller. Although this room is more than two hundred and fifty feet long by one hundred and fifty broad, yet there is only just space enough to pass along the avenues which separate the looms; while the clatter resulting from the movement of nearly a thousand shuttles, as many battens or lays, and many thousands of wheels, levers, and other kinds



Jacquard-Card Making.]

of machinery, is most deafening. Some of the worsted fabrics now woven by these looms are as much as ten quarters wide; while others, much smaller as to dimensions, are far more complex in respect to pattern.

It is curious to mark the changes which time, fashion, and a love of cheapness induce in the quality of the woven fabrics produced. Allusion was made in a former paragraph to the introduction of a particular variety of worsted goods called 'merinos.' But a more recent change has been the substitution of cotton for a considerable proportion of the worsted originally introduced in stuff goods. For instance, there are two kinds of stuff now made, called 'Orleans' and 'Paramatta' (why so named, it would probably be difficult to say), apparently formed of worsted; but the weft only is of worsted, the warp being cotton. The production of cotton-warped worsted goods is now perhaps the greatest feature at Bradford and Halifax, so largely have fabrics of this kind come into use. Another new material which we saw under process of weaving, called 'Khybereen' (has the fame attached to the Khyber Pass of Afghanistan had anything to do with the invention of this name?), consists wholly of worsted, of which the warp contains threads of two colours alternately, and weft of a third colour, thus forming a kind of combination of 'stripe' and 'shot' in the pattern. Another kind is a peculiar sort of camlet, or stout worsted, for making into the 'poncho,' or South American cloak, of which specimens are to be seen in the smart shops of some of our London tailors.

We have before observed that there is one point which marks clearly the distinction between woollen and worsted goods, viz., the rubbing, or friction, or beating to which the former are subjected after weaving; whether the rubbing by which the little knots on *frieze* or *frize* are produced, or the beating which the fulling-stocks give to woollen cloth in the process of felting or fulling. In other respects the progress of manufactures and other circumstances are leading to the introduction of materials and processes intermediate between the two. Thus the changes in the growth of English fleece, the introduction of the Australian fleece, the introduction of a remarkable and beautiful kind of black wool called *Alpaca*, the admixture of a silky kind of goat's hair with the harsher fibre of sheep's wool, the removal of the restrictions to the interchange of different kinds of wool between England and other countries, the invention of wool-carding and wool-combing machines—all have led to the production of goods quite unknown to our earlier manufacturers. But there is one material employed to which we hardly knew where to assign a place, although it seems certainly to belong to woollens. This is *shoddy*, or woollen rags, torn up fibre from fibre, and made to do double duty by entering into the composition of new cloth. Sir George Head, in his 'Home Tour through the Manufacturing Districts,' gives a humorous account of the operations at a shoddy-mill, of which there are several in the clothing district. "How to make a new coat from old rags" is not exactly the problem to be solved; for the fabric produced is only used for drugget, padding, and other inferior purposes. The rags are collected from all quarters, at home and abroad, and are consigned to dealers at Leeds, Halifax, and other places. Whether they are washed previously (a somewhat necessary process, as it would appear) we do not know, but they are carried to a mill and 'devilled,' that is, dissected to utter fragments by the spikes in the machine called a 'devil.' They are then, or after some further preparation, mixed with a portion of new wool, and carded, spun, woven, &c. with some coarse fabrics. In a body of evidence given before the House of Lords on the wool trade in 1828, it was stated that at that time a kind of cheap cloth, called 'stroud,' made from woollen rags, was exported to the North American Indians, the tribes on the shores of the Mississippi, and the natives round to the west of Cape Horn. The cheap goods are often made of mixtures of Scotch wool, English skin-wool (*i.e.* wool taken from the dead sheep, which is not considered equal to sheared wool), the waste from factories, and shoddy, all inferior ingredients; and of this mixture the articles made are the cheapest druggets, carpets, and paddings. We believe, however, that within the last few years there has been a tendency to exclude the use of woollen rags in the manufacture, they being now used rather for manure than for anything else.



[The Presentation in the Temple, after F. Francia.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXI.

Francesco Raibolini, called Il Francia.

There existed throughout the fourteenth and fifteenth centuries a succession of painters in Bologna, known in the history of Italian art as the *early* Bolognese school, to distinguish it from the *later* school, which the Carracci founded in the same city—a school altogether dissimilar in spirit and feeling. The chief characteristic of the former was the fervent piety and devotion of its professors. In the *sentiment* of their works they resembled the Umbrian school, but the *manner* of execution is different. One of these early painters, Lippo (or Filippo) di Dalmasio, was so celebrated for the beauty of his Madonnas, that he obtained the name of *Lippo dalle Madonne*. He greatly resembled the Frate Angelico in life and character, but was inferior as an artist. To his heads of the Virgin he gave an expression of saintly beauty, purity, and tenderness, which two hundred years later excited the admiration and emulation of Guido. Lippo died about 1409. Passing over some other names, we come to that of the greatest painter of the early Bologna school, Francesco Raibolini.

He was born in 1450; being just four years younger than his contemporary Perugino. Like many other painters of that age, already mentioned, he was educated for a goldsmith, and learned to design and model correctly. Francesco's master in the arts of working in gold and niello* was a certain Francia, whose name, in affectionate gratitude to his memory, he afterwards adopted, signed it on his pictures, and is better known by it than by his own family name. Up to the age of forty, Francesco Francia pursued his avocation of goldsmith, and became celebrated for the excellence of his workmanship in chasing gold and silver, and the exquisite beauty and taste of his niellos. He also excelled in engraving dies for coins and medals, and was appointed superintendent of the mint in his native city of Bologna, which office he held till his death.

We are not told how the attention of Francia was first directed to the art of painting. It is said that the sight of a beautiful picture by Perugino awakened the

* For an account of the art of working in niello, and the invention to which it led, see *ante*, vol. xii., p. 437.

dormant talent; that he learned drawing from Marco Zoppo, one of the numerous pupils of Squarcione, and that for many months he entertained in his house certain artists who initiated him into the use of colours, &c. However this may be, his earliest picture is dated 1490, when he was in his fortieth year. It exists at present in the gallery at Bologna, and represents his favourite subject, so often repeated, a Madonna and Child, enthroned, and surrounded by saints and martyrs. This picture, which, if it be a first production, may well be termed wonderful as well as beautiful, excited so much admiration, that Giovanni Bentivoglio, then lord of Bologna, desired him to paint an altar-piece for his family chapel in the church of San Giacomo. This second essay of his powers excited in the strongest degree the enthusiasm of his fellow-citizens. The people of Bologna were distinguished among the other states of Italy for their patronage of native talent; they now exulted in having produced an artist who might vie with those of Florence, or Perugia, or Venice.

The vocation of Francia was henceforth determined: he abandoned his former employment of goldsmith and niello-worker, and became a painter by choice and by profession. During the next ten years he improved progressively in composition and in colour, still retaining the simple and beautiful sentiment which had from the first distinguished his works. His earliest pictures are in oil; but his success encouraged him to attempt fresco, and in this style, which required a grandeur of conception, and a breadth and rapidity of execution for which his laborious and diminutive works in gold and niello could never have prepared his mind or hand, he appears to have succeeded at once. He was first employed by Bentivoglio to decorate one of the chambers in his palace with the story of Judith and Holophernes; and he afterwards executed in the chapel of St. Cecilia a series of frescoes from the legend of that saint. "The composition," says Kugler, "is extremely simple, without any superfluous figures; the action dramatic and well conceived. We have here the most noble figures, the most beautiful and graceful heads, a pure taste in the drapery, and masterly backgrounds." It should seem that nothing more than the merits here enumerated is required to constitute perfection: unhappily these fine specimens of Francia's art are falling into ruin and decay.

The style of Francia at his best period is very distinct from that of Perugino, whom he resembles however so far as to show that the features of the latter were the first objects of his emulation and imitation. In the works of Perugino there is a melancholy verging frequently on sourness and harshness, or fading into insipidity. Francia in his richer and deeper colouring, his ampler forms, and the cheerful, hopeful, affectionate expression in his heads, reminds us of the Venetian school.

His celebrity in a short period had extended through the whole of Lombardy. Not only his native city, but Parma, Modena, Cesena, and Ferrara, were emulous to possess his works. Even Tuscany, so rich in painters of her own, had heard of Francia. The beautiful altar-piece which has enriched our National Gallery since the year 1841, was painted at the desire of a nobleman of Lucca.

It is composed of two separate pictures. The larger compartment contains eight figures rather less than life. In the centre on a raised throne are seated the Virgin and her mother St. Anne. The Virgin is attired in a red tunic and a dark blue mantle which is drawn over the head. She holds in her lap the Infant Christ, to whom St. Anne is presenting a peach. The expression of the Virgin is exceedingly pure, calm, and saintly, yet without the seraph-like refinement which we see in some of Raphael's Madonnas: the head of the aged St. Anne is simply dignified and maternal. At the foot of the throne stands the little St. John, holding in his arms the cross of reeds and the scroll inscribed "Ecce Agnus Dei (*Behold the Lamb of God!*)" On each side of the throne are two saints. To the right of the Virgin stands St. Paul holding a sword, the instrument of his martyrdom; and St. Sebastian bound to a pillar and pierced with arrows. On the left, St. Lawrence with the emblematical gridiron and palm-branch, and another saint, probably St. Frediano. The heads of these saints want elevation of form, the brow in all being rather low and narrow; but the prevailing expression is simple, affectionate, devout, full of faith and hope. The background is formed of two open arches adorned with sculpture, the blue sky beyond: and lower down, between St. Paul and St. Sebastian, is seen a glimpse of a beautiful landscape. The draperies are grand and ample; the colouring rich and warm; the execution most finished in every part. On the cornice of the raised throne or pedestal is inscribed FRANCIA AURIFEX BONONIENSIS P. (*i. e.* painted by Francia, goldsmith of Bologna), but no date. It measures six feet and a half high by six feet wide.

Over this square picture was placed the lunette, or arch, which now hangs on the opposite side of the room. It represents the subject called in Italian a *Pietà*—the Dead Redeemer supported on the knees of the Virgin mother. An angel clothed in green drapery supports the drooping head of the Saviour; another angel in red kneels at his feet. Grief in the face of the sorrowing mother—in the countenances of the angel reverential sorrow and pity—are most admirably expressed.

This altar-piece was painted by Francia about the year 1500, for the Marchesa Buonvisi of Lucca, and placed in the chapel of the Buonvisi family in the church of San Frediano. It remained there till lately purchased by the Duke of Lucca, who sent it with other pictures to be disposed of in England. The two pieces were valued at 4000*l.*; after some negotiation our government obtained them for the National Gallery at the price of 3500*l.*

The works of Francia were, until lately, confined to the churches of Bologna and other cities of Lombardy; now they are to be found in all the great collections of Europe, that of the Louvre excepted, which does not contain a single specimen. The Bologna Gallery contains six, the Berlin Museum three of his pictures.* In the Florentine Gallery is an admirable portrait of a man holding a letter in his hand. In the Imperial Gallery at Vienna there is a most exquisite altar-piece, the same size and style as the one in the National Gallery, but still more beautiful and poetical; and the Gallery at Munich contains a picture by him, perhaps the most charming he ever painted. It represents the Infant Saviour lying on the grass amid roses and flowers; the Virgin stands before him, looking down with clasped hands, and in an ecstasy of love and devotion, on her divine son: the figures are rather less than life. A small but very beautiful picture by Francia, a Madonna and Child, is in the possession of Mr. Frankland Lewis.

It is pleasant to be assured that the life and character of Francia were in harmony with his genius. Vasari describes him as a man of comely aspect, of exemplary morals, of amiable and cheerful manners: in conversation so witty, so wise, and so agreeable, that in discourse with him the saddest man would have felt his melancholy dissipated, his cares forgotten; adding that he was loved and venerated not only by his family and fellow-citizens, but by strangers and the princes in whose service he was employed. A most interesting

* One of these (No. 256) is a repetition of the Pietà in our National Gallery.

circumstance in the life of Francia was his friendship and correspondence with the youthful Raphael, who was thirty-four years younger than himself. There is extant a letter which Raphael addressed to Francia in the year 1508. In this letter, which is expressed with exceeding kindness and deference, Raphael excuses himself for not having painted his own portrait for his friend, and promises to send it soon; he presents him with his design for the Nativity, and requests to have in return Francia's design for the Judith,* to be placed among his most precious treasures; he alludes, but discreetly, to the grief which Francia must have felt when his patron Bentivoglio was exiled from Bologna by Pope Julius II., and he concludes affectionately, "continue to love me as I love you, with all my heart." Raphael afterwards, according to his promise, sent his portrait to his friend, and Francia addressed to him a very pretty sonnet, in which he styles him, as if prophetically, the "painter above all painters:"

"Tu solo il Pittor sei de' Pittori."

About the year 1516 Raphael sent to Bologna his famous picture of the St. Cecilia surrounded by other Saints, which had been commanded by a lady of the house of Bentivoglio, to decorate the church of St. Cecilia, the same church in which Francia had painted the frescoes already mentioned. Raphael in a modest and affectionate letter recommended the picture to the care of his friend Francia, entreating him to be present when the case was opened, to repair any injury it might have received in the carriage, and to correct anything which seemed to him faulty in the execution. Francia zealously fulfilled his wishes; and when he beheld this masterpiece of the divinest of painters, burst into transports of admiration and delight, placing it far above all that he had himself accomplished. As he died a short time afterwards, it was said that he had sickened of envy and despair on seeing himself thus excelled, and, in his native city, his best works eclipsed by a young rival. Vasari tells this story as a tradition of his own time, but it rests on no other evidence,† and is so contrary to all we know of the gentle and generous spirit of Francia, and so inconsistent with the sentiments which for many years he had cherished and avowed for Raphael, that we may set it aside as unworthy of all belief. The date of Francia's death has been a matter of dispute, but it appears certain from state documents lately discovered at Bologna, that he died Master of the Mint in that city, on the 6th of January, 1517, being then in his sixty-eighth year. His son Giacomo became an esteemed painter in his father's style: in the Berlin Gallery there are six pictures by his hand; and one by Giulio Francia, a cousin and pupil of the elder Francia.

THE DYKES AND CANALS OF HOLLAND.

The proverbial industry of the Dutch has been in great measure brought forth by the extraordinary position which their country occupies with respect to the sea, and the consequent necessity of cutting canals and building dykes to regulate the exit of rivers and the exclusion of the sea.

Holland is one continuous plain, having nothing like a mountain in it, exhibiting only along the shore a range of low sand-hills, occasionally broken to admit the exit of the rivers. Immediately behind these low hills is a tract of country so little elevated, that the greatest precautions have to be made to prevent the irruption of the sea. It also results from the position of this low tract within the sand-hills, that the rivers flowing towards the sea are liable to overflow the country on either side, and form swamps and shallow lakes. Besides the canals made purposely as media either for inland navigation or for draining, there are others whose origin is curious. There is in many of the lower districts turf from twelve to twenty feet in thickness; and when this has been cut for fuel, it leaves trenches which, when filled with water, become a sort of canal or lake. These sheets of water are called *Plassen*, or *Plashes*, by the Dutch; and being all on one level and united by canals, they become navigable; but as many of these plashes when united form a considerable lake, which has waves, and injures the adjacent lands, it is the desire of the Dutch to have them drained and cultivated. For this purpose these lakes are surrounded by dykes, to keep out any accession of water; on the outside of which a "ringsloot," or surrounding drain, is made, of dimensions sufficient to be a navigable canal. The water is then raised from the interior by means of a windmill to the ringsloot, along which it passes into the sea; and the drained land then is in a fit state for cultivation, and obtains the name of a "polder."

So large a portion of Holland is below the level of the sea, that the dykes for preventing irruptions, and the canal locks for facilitating the exit of rivers, form a subject of important and paramount interest. The draining and other hydraulic operations were in the last century intrusted to certain government bodies, each of whom took certain districts, such as Rhinland, Amstelland, Goyland, Delftland, and Shieland. Since then changes have been made in the nature of the jurisdiction, but equal care is still bestowed on the subject.

The numerous branches which form the mouths of the Rhine, and the alluvial deposits which they leave, may be said almost to form a great part of Holland; and the arrangements of the canals greatly depend on the directions which these branches take. When the Rhine reaches Holland, at a place between Emmerich and Arnheim, it becomes divided into two. The greater mass takes a westerly direction, and, under the name of the Waal, pursues its way towards the sea. After passing Nimeguen it receives the waters of the Meuse, or the Maas, and then spreads out into an internal sea, called Holland's Diep; whence it passes by Dort and Rotterdam. The northern branch of the Rhine becomes split into many minor branches, one of which passes by Zutphen into the Zuydersee; another joins the Meuse near Rotterdam; and a third, forming the most important part, proceeds onward to Utrecht. Here another subdivision occurs: one sub-branch, called the Amstel, flows from Utrecht through Amsterdam to the Zuydersee; while the other, which still retains the name of the Rhine, once more suffers a subdivision, the northern branch flowing into the Lake of Haarlem, and the other flows into the sea at Katwyk. Thus the noble river becomes split into a system of arteries percolating the country in all directions, and feeding the inland lakes.

It is supposed that the great northerly branch of the Rhine originally flowed into the Lake of Haarlem, and thence past Amsterdam into the Zuydersee; and that the western course into the German Ocean is an artificial cutting. But whether or not the channel of Katwyk was a natural one, it is recorded that this channel became choked up in the year 841, by sand being driven directly across its mouth. After that, the northern branch of the river flowed past Leyden into Haarlem Lake. Within a few years, however, a canal has been cut to Katwyk, small as to actual length, but exhibiting very extensive works; the object of which is to maintain a western outlet for the Rhine without flowing into Haarlem Lake. The author of the

* This drawing is said to exist in the collection of the Archduke Charles at Vienna.—See Passavant.

† His expression is, "*come alcuni credono* (as some believe)".

'Family Tour in South Holland,' after speaking of the various branches of the Rhine, describes the Katwyk branch as follows:—

"The province of Holland in general, however, and the district of Rhinland in particular, are most deeply concerned in the smallest or Leydan branch, as by the proper management of this stream only is that part of the country preserved from one sweeping inundation. The main works for this purpose are at Katwyk, where, by very simple but effectual contrivances of flood-gates, the waters of the Rhine are let out into the sea, and those of the sea shut out from the land. The distance from Leyden is about ten miles, through five of which, nearest to the sea, a broad and deep canal has been cut, across which a triple set of double gates have been thrown, the first having two pair, the second four pair, and the last seven pair, with stone piers of excellent masonry between them. Against these last gates the tide rises twelve feet, and to take off the pressure, an equal depth is preserved in the great dam within them. When the Rhine has accumulated behind the other gates to a certain height, the whole of the gates are thrown open at low-water, the rush of which completely scours the passage of sand, which, before the adoption of these gates, used constantly to choke up the channel of the Rhine; and the waters, thus impeded, frequently inundated the country, and had more than once threatened Leyden with destruction. It has been calculated that these seven gates, when thrown open, are capable of discharging a volume of water not less than one hundred thousand cubic feet in a second of time." From this description it would appear that the level of the water in the Rhine near Katwyk is lower than high-water level, but higher than low-water level in the sea.

Further details concerning the Katwyk Canal were given in a paper read before the Institute of Civil Engineers a year or two ago. From this paper it appears that the district called Rhinland, between Leyden and the sea, was six centuries ago about on a level with the medium tide in the open sea; and that each 'polder,' or cultivated spot, was separately protected from the spring-tides by an embankment. Since that period a change is said to have occurred in the relative levels of the Rhinland and the surrounding waters, either by the sinking of the land or the elevation of the sea, whereby the Zuydersee is above the level of the Rhinland district. A consequence of this is that the northern branch of the Rhine and the Zuydersee itself have such a tendency to overflow the land, that water-machines moved by windmills are everywhere in request for draining the land. The district of Rhinland contains about 317,500 English acres, of which 127,077 are occupied by polders, or districts embanked and drained by windmills; 32,155 by lakes and peat-bogs already laid dry; 61,575 by higher land and sand-banks, and 69,692 by lakes, canals, ditches, &c. The drainage of this district is effected by two hundred and sixty-eight windmills, working scoop-wheels, or Archimedean screws. Ever since the choking up of the Katwyk mouth by sand six centuries ago, attempts have been from time to time made to form an outlet for the waters. By about the year 1440 the repairs of the embankments had become so expensive, that the landowners abandoned their estates rather than pay the cost of preserving them. In 1573, when the city of Leyden was besieged by the Spaniards, every attempt was made to cause an influx of the waters, as a means of annoying the invading army; but this project was dearly purchased, for the expense of afterwards renewing the works would have been so great, that matters were left as they were for a long period. In 1627 attention was again directed to the subject, and Katwyk was pointed out as the only spot for an effectual system of drainage. From that time repeated plans were formed by engineers for making a good outlet at Katwyk, and in most of these the draining of Haarlem Lake was included as one of the operations. At length, in 1804, a plan was finally agreed on by the government for the construction of the canal, which was completed in 1807, after many difficulties had been encountered.

The canal is described as consisting mainly of two parts, one from Leyden to the sand-banks, and the other from the sand-banks to the sea. The levels are so planned that the canal may be made the means of partially emptying Haarlem Lake, as well as draining Rhinland, for this has always been one object in view.

The Haarlem Lake, to which allusion is here made, lies between Leyden and Amsterdam; and as it is not necessary to inland navigation, the ground which it occupies would be much more valuable for cultivation: hence the anxiety of the Dutch to drain it. The lake begins a little to the north-east of Leyden, and passes northward to the town of Haarlem, where a contraction of the width separates it by a strait from a sort of narrow lake or broad river called the Y, the Ye, the Tai, or the Tye (for it is spelt in all those different ways). The Y proceeds eastward for a short distance, passes Amsterdam, and falls into the Zuydersee, a large but shallow sea which opens into the German Ocean near Texel. There seems good reason to believe that all these inland seas were produced in some way or other by the Rhine, and that they may in fact be deemed one of its mouths. The writer whom we have before quoted remarks:—"A great part of Friesland and Rhinland is still a turbary (or peat-moss), and so are the shores of the Zuydersee (or Zuyderzee, as it is often spelt). One may easily imagine that when once this light and spongy kind of earth was lifted up by the water underneath, the recoil of the waves of the sea on one side, and the impeded current of the river acting upon it, would easily carry off whole masses into the ocean."

Within the last few years paragraphs have occasionally found their way into the public journals respecting the preparation for draining the Lake of Haarlem. Although the canal of Katwyk was in part intended to effect this object, it would appear, from more recent proceedings, that this result has not yet been obtained.

It is one consequence of the extreme shallowness of Haarlem Lake and the Zuydersee, that ships cannot navigate them with safety for the purposes of commerce; and hence a canal of magnificent dimensions has been constructed for effecting that which we might from a glance at a map think that these two seas would effect. In order to get from Amsterdam to the German Ocean by sea, a ship must go a little eastward to the Zuydersee, thence northward, nearly to the extremity of that sea, and thence past the island of Texel into the sea. But it happens that the water of this sea is so shallow near Amsterdam, that heavily laden ships cannot approach the city. Hence the Grand Ship Canal was projected about twenty years ago, and forms one of the finest specimens of canal engineering. The object of this is to connect Amsterdam with the open sea without going into the Zuydersee at all; and as ships of large size were to be accommodated, the dimensions of the canal are of most unusual magnitude. It is fifty miles long, fifty-six feet wide at the bottom, a hundred and twenty-four at the top, and twenty feet deep. It is supplied with water from the sea at high tide, and is provided with two tide-locks at the ends, two sluices with flood-gates, and eighteen drawbridges. The dimensions are so great that two frigates can pass each other in the canal. The canal terminates northward at the southernmost margin of the mouth of the Zuydersee.



[Anglo-Saxon Coffin and Grave-Clothes. From a Picture of the Raising of Lazarus, in Cotton MS.]

USAGES BEFORE INTERMENT AND FUNEREAL CEREMONIES.

One of our finest old writers (Jeremy Taylor, in his 'Holy Dying'), speaking of the duties of the living in respect to the dead, observes:—"When thou hast wept awhile, compose the body to burial; which that it be done gravely, decently, and charitably, we have the example of all nations to engage us, and of all ages of the world to warrant; so that it is against common honesty and public fame and reputation not to do this office. Something is to be given to custom, something to fame, to nature and to civilities, and to the honour of deceased friends; for that man is esteemed to die miserable for whom no friend or relation sheds a tear or pays a solemn sigh. What we do to the dead, or to the living for their sakes, is gratitude, and virtue for virtue's sake, and the noblest portion of humanity." Another of our old writers (Hooker), in reference to the same subject, remarks that all men have accounted it "a very extreme destitution" not to have paid to them, after death, at least as much respect as is mentioned in the burial of the widow's son, "the carrying him forth upon a bier and accompanying him to the earth." Whatever tends to lessen the reverential regard for the dead, so natural to every person of right feeling, and spoken of so eloquently by the great writers above quoted, is a matter which concerns the public morality, and as such calls for the interference of the legislator: it is a symptom of brutishness and ignorance which cannot be too soon eradicated. These and other fearful results of bad social arrangements, which have latterly forced themselves upon public attention, or been all at once dragged into the light of day, while no one was dreaming of their existence, are of the utmost concern to the common welfare. A Report by Mr. Chadwick, on the 'Practice of Interment in Large Towns,' leads us to believe that a callous indifference and want of respect for the dead has already made great progress; but the first step towards its correction is a knowledge of its existence, the extent to which it prevails, and the circumstances in which it originates. The present, like all Mr. Chadwick's Reports, is remarkable for the administrative ability which it displays, and, as has been observed of his former Reports, it also is "admirable in all respects for excellence of composition, soundness of judgment, and all that indicates the possession of every species of talent."*

Passing by for the present the ample evidence in the Report relative to the bad effects of interments within large towns, we come to the section devoted to an account of the injuries to the health of survivors occasioned by the delay of interments, and which, unless the practice were altered, would exist, if burial were entirely prohibited amidst the dwellings of the living. Taking London, for example, it is found that a large proportion of the labouring classes have but a single room: "it is their bed-room, their kitchen, their washhouse, their sitting-room, their dining-room; and when they do not follow any out-door occupation, it is frequently their work-room and their shop. In this one room they are born, and live, and sleep, and die amidst other inmates." Mr. Liddle, the medical officer of a district in Whitechapel inhabited by dock-labourers, 'navigators,' bricklayers' labourers, and others of the working classes, thus describes the situation of one of these families on the occurrence of a death:—"The corpse is kept in the room where the inmates sleep and have their meals. Sometimes the corpse is stretched on the bed, and the bed and clothes are taken off, and the wife and family lie on the floor. Sometimes a board is got, on which the corpse is stretched, and that is sustained on tressels or on chairs. Sometimes it is stretched out on chairs. When children, they are frequently laid out on the table. The poor Irish, if they can afford it, form a canopy of white calico over the corpse, and buy candles to burn by it, and place a black cross at the head of the corpse. Sunday is the day usually chosen for the day of burial; but if a man die on the Wednesday, the burial will not take place till the Sunday week following." The practice of late interments seems to be general amongst every class in the metropolis. In the north of England, and in the rural districts generally, the time between dissolution and burial is much shorter. An undertaker residing in the Whitechapel

* Lord Brougham

district states that sometimes the remains of the dead are kept three weeks, all the ordinary occupations of a family going on the whole time in the same single room. The consequences are too shocking and revolting for publication in a work intended for general readers. While the widow is out making arrangements for the funeral, the children are commonly left alone with the corpse. There can be no doubt whatever as to the propriety of burial beyond the limits of towns, but the effects of the practice of retaining the bodies so long before interment are spoken of by medical witnesses as far more pernicious. Instances are given where one member of a family after another has been hurried to an untimely grave in consequence of exposure to the miasma of decomposition in a highly concentrated form. Where a death occurs, the survivors, exhausted in body by watching, and depressed by grief, are peculiarly susceptible of disease.

Mr. Chadwick shows that of the deaths which take place in the metropolis, more than one-half are the deaths of the labouring classes, of whom four out of five families have each but one room. In the case, then, of upwards of 20,000 deaths annually in London, there occurs the retention of the corpse amidst the family in the shocking manner already described; and of some 4000 deaths from epidemics in the metropolis, there is, besides the same distressing scene, peculiar danger, and perhaps permanent injury to the survivors. The mental pain and moral evils generally attendant on the practice of the long retention of the body in the rooms in use, and amidst the living, is, if possible, still more deplorable than the evils of physical contagion. Mr. Chadwick remarks:—"When the dissolution has taken place under circumstances such as those described, it is not a few minutes' look after the last duties are performed, and the body is composed in death and left in repose, that is given to this class of survivors, but the spectacle is protracted hour after hour, through the day and night, and day after day, and night after night, thus aggravating the mental pain under varied circumstances, and increasing the dangers of permanent bodily injury. The sufferings of the survivors, especially of the widow of the labouring classes, are often protracted to a fatal extent. To the very young children, the greatest danger is of infection in cases of death from contagious and infectious disorders. To the elder children and members of the family and inmates, the moral evil created by the retention of the body in their presence beyond the short time during which sorrow and depression of spirits may be said to be natural to them, is, that familiarity soon succeeds and respect disappears. . . . The mental effects on the elder children or members of the family, of the retention of the body in the living-room, day after day and during meal-times, until familiarity is induced,—retained, as the body commonly is, during all this time in the *sordes* of disease, the progress of change and decomposition disfiguring the remains and adding disgust to familiarity,—are attested to be of the most demoralizing character."

Mr. Chadwick points out the influence of these circumstances on the character:—"Astonishment is frequently excited by the cases which abound in our penal records indicative of the prevalence of habits of savage brutality and carelessness of life amongst the labouring population; but crimes, like sores, will commonly be found to be the result of other influences than are externally manifest; and the reasons for such astonishment will be diminished in proportion as those circumstances are examined which influence the minds and habits of the population more powerfully than precepts or book-education. Among those demoralizing circumstances which appear to be preventible or removeable, are those which the present inquiry brings to light. Disrespect for the human form under suffering, indifference or carelessness at death—or at that destruction which follows as an effect of suffering—is rarely found amongst the uneducated, unconnected with a callousness to others' pain, and a recklessness about life itself. A known effect on uneducated survivors of the frequency of death amongst youth or persons in the vigour of life, is to create a reckless avidity for immediate enjoyment. Some examples of the demoralization attendant on such circumstances cannot but be apparent in the course of this inquiry into other practices connected with interment."

A clergyman, who testifies from personal knowledge to the justness of Mr. Chadwick's views on the present practice relating to the interment of the dead amongst the labouring classes, remarks:—"With the upper classes a corpse excites feelings of awe and respect; with the lower orders, in these districts (a wretchedly crowded parish), it is often treated with as little ceremony as the carcass in a butcher's shop. Nothing can exceed their desire for an imposing funeral—nothing can surpass their efforts to obtain it; but the deceased's remains share none of the reverence which this anxiety for the becoming burial would seem to indicate. The inconsistency is entirely, or at least a great part, to be attributed to a single circumstance—that the body is never absent from their sight—eating, drinking, or sleeping, it is still by their side; mixed up with all the ordinary functions of daily life, till it becomes as familiar to them as when it lived and moved in the family circle. From familiarity it is a short step to desecration. The body, stretched out upon two chairs, is pulled about by the children, made to serve as a resting-place for any article that is in the way, and is not seldom the hiding-place for the beer-bottle or the gin if any visitor arrives inopportunely. Viewed as an outrage upon human feeling, this is bad enough; but who does not see that when the respect for the dead, that is, for the human form in its most awful stage, is gone, the whole mass of social sympathies must be weakened—perhaps blighted and destroyed?"

Mr. Chadwick shows that the progress of this dreadful demoralization, which must otherwise go on with the increased crowding of an increasing population, is capable of being stayed by legislative means, which would extend a benign and elevating influence amongst the survivors on the occurrence of a death in a family. The nature of the measures proposed must be noticed at another time.

ON POPPY-OIL AND OPIUM.

THAT the exciting and destructive substance *opium* should be derived from the same source as the bland and useful *poppy-oil*, is only one among many similar instances which the vegetable kingdom affords; but it is not on that account less worthy of our notice. What opium is, and what are the extraordinary effects which it produces on the human frame, have been sufficiently noticed in No. 162; what are the commercial and political circumstances connected with the smuggling of opium from India into China have been glanced at in No. 509, and are repeatedly coming under public notice in some quarter or other; but the connection between opium and poppy-oil as the produce of the same plant forms a different subject.

Mr. J. Young, in a paper on poppy-oil, in one of the scientific journals a few years ago, states that the cultivation of the poppy for the benefit of its oil as an article of food and for other useful purposes, has been long carried on to a great extent in France, Germany, and the Netherlands. Although it was long since

known that the seed of the poppy and the oil obtained from it do not possess narcotic properties, and that it was baked into cakes and used as an article of food by the ancients, yet there has been much contention respecting the propriety of using it. In France, about the beginning of the seventeenth century, the opposition to the general use of poppy-oil as an article of food became so violent, that the lieutenant-general of the police of Paris ordered the medical faculty of that city to make the strictest examination concerning this point; and they reported, that as there is nothing narcotic or prejudicial to health in the oil, the use of it might be permitted. But this decision proved to be unsatisfactory; and popular clamour determined the court to pass a decree, in the year 1718, prohibiting the sale of poppy-oil, whether mixed or unmixed. The sale of the article, however, was clandestinely encouraged, and gradually increased until the year 1735, when the court issued a severer decree, enjoining the superintendents to mix a certain quantity of the extract of turpentine with every cask containing eleven hundred pounds weight of this oil, probably with a view to check its supposed injurious effects.

In the year just named the consumption of this oil in Paris alone amounted to ten thousand casks; but as the secret demand for it increased every year till 1773, a Society of Agriculture, in the last-named year, undertook to examine all that had been alleged for and against the general use of this oil. Experiments were repeated in the presence of the most distinguished chemists; and the Society presented a petition to the minister of police, setting forth the great advantages that would accrue both to commerce and agriculture by reversing the prohibition. This society again made several experiments in the year 1776, and finally confirmed the decree of the faculty in 1717, declaring that the oil of poppies was not injurious to health; that it did not contain a narcotic power, and that it might be recommended to general use with the utmost safety. From that time the cultivation of the poppy has not met with any formidable opposition, and has increased to such a degree both in France and in the Netherlands, that great quantities have been exported thence, independent of the quantity retained for home use; and in seasons of scarcity it has been found of the most essential service in all cases where the use of oil was required. In the northern parts of France it was used by soapboilers as a substitute for other oils, which were extremely dear; and in some part of the Netherlands the oil-cakes are used as fattening food for cattle.

Mr. Young observes:—"It is well known that maw-seed, obtained from a variety of the poppy, has long been used in this country for feeding birds. I have a canary that has been fed upon white poppy-seeds for many months; and I supplied a person with this seed who breeds canary-birds for sale; he gives them nothing else to eat, and observes that they thrive as well as when fed upon common seed. According to Dr. Alston, the poppy-seed is used as food in some places, as well as the expressed oil, which he says is as innocent and wholesome as olive-oil. And Mr. Kerr relates that the seeds of the poppy are sold in the market and are reckoned delicious eating; they are used in emulsions, and enter into the cooling prescriptions of the Hindostan physicians. This is corroborated by Mr. A. W. Davis. According to him, the seeds are valuable for the oil they contain; and as an article of food are in great request with the natives; and when used in this way the oil is scarcely to be distinguished from olive-oil, which is often adulterated with it. I have seen large quantities of poppy-seed exposed for sale in the bazaar of Calcutta. We are told, by Mr. O. A. Fisher, in his 'Letters written during a Journey to Montpellier in the year 1804,' that the oil of Provence, which on account of its purity, mildness, and fine flavour is celebrated all over Europe, is exported to Italy in large quantities, and was formerly exported to many distant countries; but since the hard winters of 1789 and the following years, so many olive-trees have been frozen, and during the Revolution so few planted, that Aix (which was the principal seat of its traffic) has now entirely lost its first and most lucrative branch of commerce." These circumstances have greatly tended to increase the use of poppy-oil.

The mode of culture and preparation of the poppy depends on the purpose to which it is to be applied or the part of the plant which is to be brought to use. The opium is a milky juice obtained by incision; the oil is expressed from the seeds contained in the capsule; while the capsule itself—the globular shell to which the name of "poppy-head" is frequently applied—is extensively used in medicine.

The routine of proceedings in the province of Bahar in India, where opium is the chief product required, has been thus described:—The field being well prepared by the plough and harrow, and reduced to an exact level superficies, is then divided into quadrangular areas of seven feet long and five feet in breadth, leaving two feet of interval, which is raised five or six inches, and excavated into an aqueduct for conveying water into every area; for which purpose there is a well prepared in every cultivated field. The seeds are sown in October or November. The plants are allowed to grow six or eight inches distant from each other, and are plentifully supplied with water. When the young plants are six or eight inches high, they are watered more sparingly; but the cultivator strews all over the areas a nutrient compost of ashes, dung, and nitrous earth scraped from the highways and from old mud walls. When the plants are on the point of flowering, they are watered profusely, to increase the juice. When the capsules are half grown, no more water is given. The cultivators then begin to collect the opium in the following manner:—At sunset they make two longitudinal double incisions upon each half-ripe capsule, passing from below upwards, taking care not to penetrate into the interior cavity of the capsule. The incisions are repeated every evening, until each capsule has received six or eight wounds: and after each incision the dews of the succeeding night facilitate the exudation of the juice. Care and selection are required in these operations; for if the capsule be allowed to ripen too much, it will yield hardly any juice; and if the incision were made in the heat of the day, the exudation would not occur in a proper manner.

Early in each morning after an incision has been made, old women, boys, and girls collect the juice by scraping it off the wounds with a small iron scoop, and deposit the whole in an earthen pot, where it is worked by the hand in open sunshine, until it acquires a thicker consistence. It is then formed into cakes of a globular shape, about four pounds in weight, and laid in little earthen basins to be further dried, the cakes being covered over either with tobacco leaves or with the leaves of the poppy; and there they are kept till dry. These masses then constitute the opium of commerce. The Indian opium is, as here described, sold in roundish masses, covered by leaves; while the Turkish opium is in flatter pieces, also covered by leaves.

Such is the general mode of cultivating the poppy in India, where the opium, or inspissated juice of the capsule, is the chief object held in view. Where the cultivation of this plant, as in Europe, is directed more to the production of seeds for oil than to that of opium, the arrangements, as described by Mr. Young, are nearly as follows:—

Mr. Young states that he made an experiment to determine which is the best mode of sowing the seed. He adopted three different modes: in the first of which he sowed broad-cast, upon beds three feet wide, with an alley between, and thinned out to the distance of four or five inches; in the second instance he sowed in beds three feet wide, in rows—six rows to a bed, and six inches between the plants; in the third instance he sowed on the spaces between rows of early potatoes, four feet wide, with two rows of poppies in each space, twelve inches between the rows of poppies, eight inches between the poppy plants, and three feet between each double row of poppies, occupied by one row of early potatoes. In the first method the seed produced only one capsule; in the second, two; and in the last, from three to seven or eight. On this point he observes:—"The seed of the poppy comes to maturity after the extraction of the opium; and when it is considered that it yields more than a third part of its weight of oil, and that a crop of early potatoes equal to thirty-six bolls per acre can be raised by the same culture on the same space of ground, with a crop of opium equal to fifty-six pounds, there is scarcely any plan that can be devised which would prove equally profitable to the cultivator, or more beneficial to the community. One acre of poppies cultivated in wide drills will produce in a good season one thousand pounds of seed, which will give by expression three hundred and seventy-five pounds of oil."

After the opium harvest is over, the seeds are ready for gathering about the end of August. This is done by drawing the entire plants out of the ground, binding a sufficient number together, and placing them against each other in the manner of corn-sheaves, letting the whole remain in the fields a few days until perfectly dry. The sheaves are then laid upon a large cloth, the capsules bruised, and the seeds taken out; after which the seeds are passed through a sieve.

As soon after the collection of the seed as may be convenient, the oil is extracted from them; for if this be long delayed the oil yielded is smaller in quantity, inferior in quality, and badly coloured. The mill, the press, and the bags are all used perfectly clean. The first oil is destined for the use of families, and this is 'cold-drawn,' as any degree of warmth injures the flavour. After as much is extracted in this manner as possible, a considerable quantity of inferior quality is obtained by heating the cakes and pressing them a second time. The oil which is first procured is of a pale colour, is peculiarly bland and soft, and has a flavour approaching that of almond-oil. It is used for salads and other domestic purposes, either alone or mixed with olive-oil. When olive-oil is stale or rancid, it may be considerably improved by admixture with recently made poppy-oil. The cold-drawn oil, for domestic use, is allowed to remain five or six weeks before being used, that it may deposit in a sediment a kind of milky substance that is mixed with it. It is then poured into another vessel, and left partially exposed to the air for a time.

The second-drawn oil is of a deeper colour, and is applicable to all the purposes of the more common oils, artists using the finer sorts of it as a drying oil. It preserves the colour of some kinds of paint better than the other oils, and is free from their disagreeable smell.

Holland was supplied with this oil for a considerable time from France, and it was sold there under the name of olive-oil, or mixed with it in considerable abundance. About the year 1799 it was stated that the poppy was cultivated in Holland solely for its oil and oil-cake, which yielded a profit of about 8*l.* sterling per acre, after paying expenses, the oil selling at from five to six shillings per gallon.

The medicinal uses of the plant are very numerous. The capsules, or poppy-heads, are frequently used to form an extract, and a decoction which is employed as a fomentation. The syrup of poppies is a medicine very much employed; and there are many others, such as Godfrey's Cordial and 'soothing' medicines, whose chief object is to lull the sense of pain, in which the narcotic principle of the plant is brought into action. But the mode in which medicines of this kind are often made and used has been proved to be very mischievous, sufficient care not being observed in apportioning the strength of the medicine to the strength of the patient. For this reason, among others, it is rather a dangerous 'domestic' medicine in any of its forms, since it requires the skill of an experienced person to determine when and how it may be safely used.

Rapid Manufacture of Honey.—How much honey a swarm of bees will gain in a day, depends on the largeness of the swarm, and goodness of the weather. If the swarm be very large, and the weather very good, and they are no way disturbed by breaking down the ladders, they will gain twenty-eight pounds in fourteen days or little more. My father once had a swarm of bees, which had stood only seven days, and being desirous of knowing how much they had gained, in heaving them up he broke down all their works. To prevent the honey from being lost, he took the comb, honey, and bees together into a brass pan. After straining it off, besides what was lost, he had fourteen pounds of clear maiden honey.—*Cotton's Bee-Book.*

Machine at Tresavean Mine (Cornwall).—This is a machine for facilitating the ascent and descent of miners, by which four hundred and ninety persons are daily relieved from the arduous labour of going by ladders to the depth of 290 fathoms, or 1740 feet, and of ascending by the same means: after eight hours of severe muscular exertion underground, every one must feel the importance of this ingenious application of mechanical and steam powers. The engine employed is of thirty-six inches cylinder, double acting, six feet stroke, equal beam. The outer end of the beam is connected by a sweep-rod and crank to a shaft on which are fixed two small pinion wheels, which drive two others of five times their diameter; thus the engine makes five strokes to one revolution of the large wheels. In one of the arms of each of the larger wheels, at a distance of six feet from the centre, is a pin, to which a rod is connected; each rod consequently makes a stroke of twelve feet at every revolution of the wheel. These rods, which are of Norway wood, eight inches square, are continued to the depth above stated, and to these are attached platforms quite large enough for one person to stand on, at every six feet. Four feet above each platform there is a handle, consisting of a round bar of iron three-quarters of an inch in diameter, and two feet long, fixed vertically in the rod, which is laid hold of by the person on his stepping from one platform to another, and by holding it he maintains his footing on the platform when the rods are in motion with perfect ease and safety. A man takes his stand on one of these platforms, and is at once lowered or raised, as the case may be, twelve feet, when he steps to the platform on the other rod, and immediately is carried over another equal space. The speed of the engine is fifteen strokes per minute, by which each rod makes three strokes, or travels thirty six feet. The rate of descending and ascending is therefore seventy-two feet in the minute. The time spent by the miner in climbing from the depth of 1740 feet was upwards of an hour; now, without any more fatigue than he would have in making about one hundred and forty steps upon level ground, he is brought to the surface in twenty-four minutes, or carried to an equal depth. This machine was erected by Mr. Michael Loam, a Cornish engineer; but the miners are principally indebted for it to the benevolent exertions of a few individuals, who, in the most noble manner, offered, through one of the county institutions, a premium of 500*l.* to the first mine which should adopt some plan for relieving the miners from climbing. From one hundred and thirty to one hundred and forty men can descend, and the same number ascend, at the same time. The principal agent at the mine assures us, that not only has the health of the men been visibly improved since the introduction of the machine, but they have cheerfully completed one-fifth more work without an increase of wages.—*Great Western (Bristol) Advertiser.*



[1, Papilio Machaon; 2, Apatura Iris; 3, Hipparchia Megæra; 4, Vanessa Polychloros; 5, Vanessa Urticæ; 6, Vanessa Atalanta; 7, Vanessa Io

CURIOSITIES OF BRITISH NATURAL HISTORY.

Butterflies.—No. II.

In our previous notice of the present group of insects we ventured upon a few observations relative to their caterpillar condition, and the changes through which they pass in their progress from the egg to a state of maturity. We may not unappropriately follow out the subject by adverting to some points of interest in the organization of the perfect butterfly. We need scarcely say that, according to the nature of their food, the structure of the mouth is expressly modified. No one can fail to observe the great difference between the mouth of the Beetle and the Butterfly: in the former the mouth is *mandibulate*, that is, formed for gnawing and seizing; in the latter it is *haustellate*, converted into a proboscis for suction. Yet in both, it would appear that the same constituent parts exist, varied as they may be in shape and use.

In order to render the subject clear, let us first explain the parts of a mandibulate mouth, which, as we have observed, is formed for mastication and seizing. It consists of a *labrum*, or upper lip; a *labium*, or under lip; two *mandibles*, or jaws; two *maxillæ*, or under jaws; and a *tongue*. To the maxillæ, or under jaws, are attached a pair of feelers called maxillary *palpi*; and a similar are also attached to the labium, or under lip, and called labial *palpi*. Each of the parts enumerated requires further explanation. The labrum, or upper lip, is usually a movable organ terminating the face, so to speak, anteriorly, and its use appears to be to keep the food in its proper place during the action of the mandibles upon it. The labium, or lower lip, is opposed to the upper lip and serves a similar purpose; acting conjointly with it. The labial palpi have usually two joints, exclusive of their basal attachment, and therefore consist of three portions, like the finger; they serve as feelers of the food. Between the upper and under lip are the two pairs of jaws, acting horizontally; namely, the mandibles and maxillæ. The upper, or mandibles, are used for manducation. When viewed from above or beneath, they generally present a figure more or less approaching to a triangle, but are exter-

nally convex, internally concave, the concave surface being mostly furnished with serrated processes or teeth. Let our reader examine the mouth of one of the beetle race, while reading these details.

As insects with the jaws formed on the principle described vary in their food, so do these upper jaws vary in their details, as do the teeth of quadrupeds.

In some (the Cerambicidæ, Tenebrio, &c.) which gnaw vegetable food, there is something in the form of the upper jaws analogous to the incisor teeth of Rodents, as the hare.

In carnivorous insects, as Cicindela, Carabus, Staphilinus, the upper jaws remind us of the formidable canines of the tiger, or the sharp beak of the falcon, and are often armed with acute serrations or an array of spear-like points. In some which feed upon hard vegetable matter the upper jaws are stout, short, and strong, and have a lobe at or near their base, and a broad crushing or grinding surface, reminding us of the molar teeth of the Ruminant or Pachydermatous orders of quadrupeds.

In some insects the mandibles are destitute of teeth; in these cases, if the mandibles be long and sharp, the insect feeds upon soft animal substances, as worms; but sometimes this sort of jaw is furnished with a minute orifice near the apex, and in this case the insect pierces its prey, and sucks the juices through a tube perforating the mandible itself.

Another modification is seen in the upper jaws of the stag-beetle (Lucanus Cervus). The jaws are immense, and resemble the antlers of the stag. As this beetle is not carnivorous (as might be presumed from such a structure), and as the jaws are equally unfitted for the mastication of vegetable matter, the question arises—to what are they adapted? It has been suggested to us by a naturalist who has studied the habits of this species, that these mandibles are used for piercing and lacerating leaves and twigs, thereby causing a flow of sap, upon which the beetle habitually feeds.

We next come to the under jaws, or maxillæ, which are placed beneath the mandibles, and move nearly parallel to them. Exclusive of the maxillary palpus, or feeler, they consist each of an upper lobe composed of two or three joints, and a lower lobe or division, the true under jaw, which is generally sharp, somewhat resembling the mandible, but furnished with numerous spines or bristles on its internal aspect. These parts vary greatly in different groups; but the maxillary palpus is seldom wanting. The upper lobe, or section between the palpus and the true under jaw, is frequently absent or rudimentary. The under jaws appear to be used principally for turning the food about while the mandibles are at work upon it.

The tongue (lingua) is situated within the labium, or under lip, and sometimes emerges from it; in many cases it constitutes an organ for collecting food, which it transmits to the gullet. In these instances it is peculiarly modified and developed.

So far have we described a mandibulate mouth, as we find it in beetles; but let us turn to the haustellate mouth of the butterfly, and great will be our astonishment at the difference.

In this reveller among flowers, the honey of which it sucks from the nectary, the maxillæ, or lower jaws, are most wonderfully modified—they are no longer hard pincers, but form slender elongated tubes, and together constitute a long slender proboscis, resembling the fine tendril of a vine. Each maxilla is lengthened into a long annulated cartilaginous filament, governed by two layers of spiral muscular fibres, and is moreover hollowed longitudinally. The sides which oppose each other are channelled like a split reed, so that when the edges of each tubular filament are put together, and interlocked by means of a multitude of most minute barbs (like those along the plumelets of of a feather), they form an intermediate tube of a square shape. Thus, then, we have three tubes, the central leading to the gullet. This curious proboscis when not in use is coiled up and concealed; but it can be unfolded, and inserted into the nectary of the flowers, the liquid honey contained therein being imbibed through the central tube, which, as we have said, leads to the gullet, or commencement of the œsophagus.

As the butterfly cannot exhaust the air in this central tube, as animals breathing through their lungs would exhaust a pipe continued from the mouth, and so suck up liquid, we must necessarily suppose the operation in the case of the butterfly to be performed in a very different way; and it cannot be doubted that the lateral tubes, by the action of the spiral fibres surrounding them, have the power of producing a vacuum in the middle passage, so as to effect the rise of the nectar.

These filamentous maxillæ are developed at the expense of the other parts of the mouth, which, though minute and undeveloped, may nevertheless be demonstrated. These are, more or less rudimentary, mandibles, a labrum, a labium, and labial and maxillary palpi; the latter indeed are large, and easily distinguishable, in the form of two plumose appendages, one on each side of the base of the proboscis. How different the leaf-cutting mouth of the voracious caterpillar from the nectar-sucking proboscis of the bright-winged butterfly. The one, like the phytophagous beetle, is furnished with hard horny jaws, formed for crushing the substance of plants and herbage; in the other, by a marvellous change, we find a slender, tubular, elongated proboscis, fitted only for robbing the flowers of their honeyed treasures.

From these preliminary remarks, we pass to the species figured at the head of this article.

1. The Swallow-tail Butterfly (Papilio Machaon). This beautiful species, though by no means so rare as its ally the P. Podalirius (which indeed can scarcely be called a British butterfly), is yet by no means generally abundant. It has never been observed in Scotland, and seldom in the northern counties of England. In Cambridgeshire it is stated to be tolerably common within the fenny districts, and it has been observed in Sussex, Essex, Hampshire, Middlesex, and Kent. On the Continent it is not unfrequent, and is abundant in Syria and Egypt, as well as in several parts of France, Italy, &c. It does not appear on the wing in our island till the beginning of June. We believe that it has not hitherto been noticed in Ireland.

Of all our indigenous butterflies this is the largest; the female, which, as usual, exceeds the male in size, not unfrequently measuring three inches and a half in expanse of wings. Its flight is powerful. The general colour of the wings is black, powdered with yellow, and relieved by bold yellow markings, which colour indeed is spread over the basal half of the hinder wings. From the posterior margin of these projects an acute slip, which may be compared to the outer tail-feathers of the swallow, and at each inner corner is an ocellated spot of red, with an anterior crescent of light blue; the whole nearly surrounded by a ring of black. The body is black, covered with yellow hairs, which form a conspicuous line on each side of the thorax. The caterpillar is of moderate size, smooth, of a greenish colour, each segment being banded with a black line spotted with red. Umbelliferous plants, as fennel, carrot, &c., constitute its food; in some districts in France where it is abundant, it is notorious for the ravages it makes on the latter vegetable.

2. The Purple Emperor, or Highflyer (Apatura Iris).

It is only in the oak-woods of the more southern counties of our island that this splendid butterfly appears, and that not in abundance; it has been styled "the purple emperor of the British oak;" and if beauty, strength of wing, fearlessness, and a lofty, bold, and vigorous flight entitle it to pre-eminence, it certainly stands at the head of our native butterflies. It seldom makes its appearance before the month of July, and may then be seen during the middle of the day, while the sun glows with meridian effulgence, soaring on rapid wings high over the summits of the tallest oaks, on the topmost twigs of which it settles for repose towards the approach of evening. No species of butterfly is captured with so much difficulty (a net at the end of a rod thirty feet long being necessary for the chase), unless indeed it should chance to settle on the ground, when it permits the closest approach. This, however, is a rare occurrence; on the contrary, it often mounts beyond the power of eye-sight. This account refers more particularly to the males, for the females are far more rarely seen on the wing, but keep to the tops of the oaks, and consequently are far less frequently captured than the other sex.

The wings of this species are firm in texture; their general colour above is dark brown, changing in certain lights into rich purplish blue of metallic lustre, and relieved by marks of white. On the hinder wings near the inner angle is a small black spot surrounded by red; under surface of wings rust brown, varied with white and black; an ocellated spot on both. The caterpillar is pale green, with horns reddish at the tip. It feeds on the oak, willow, and ash.

3. The Orange Argus, or Wall Butterfly (Hipparchia Megæra).

This butterfly is by no means uncommon, and is very generally spread, appearing from May to August; it flits lightly and rapidly from one resting-place to another, expanding its wings to the sun.

The fore-wings are orange-yellow, inclining to brown, marbled and banded along the edges with dark brown. Near the outer angle an ocellated spot of white with a black ring. Hinder wings with a row of spots, from three to five in number, in a crescentic line near the outer margin; the edge banded with brown. The caterpillar is hairy, of a light green, a whitish line running along each side.

4. The Great Tortoiseshell Butterfly (Vanessa polychloros).

It is principally in the southern counties of our island that this butterfly makes its appearance, and usually about the middle of July. On the Continent it is common, more particularly in the more southern districts. It is rapid on the wing, and often settles on dry pathways and the trunks of trees, delighting in the fervent rays of the sun. The wings are angulated, and often measure upwards of two inches and a half in extent; their colour above is dark orange-red, with a narrow vandyked edging of blue, and a second of black; the fore-wings are marked anteriorly with abbreviated bands of black, and spots of the same colour about the centre; the hinder wings have a large spot of black near the middle of the anterior margin. On the under side the basal half of the wings is dark brown, the remainder yellowish grey finely marked with undulating lines of brown, and an obscure row of bluish crescents towards the tip. On the anterior wings three pale spots are observable near the fore-margin, and one near the middle of the hinder pair.

The caterpillar of this species is gregarious, spiny, and of a brownish tint, with a lateral stripe of orange; the spines are slightly branched and yellowish. Collected in groups, the caterpillars weave webs, while very young, in the branches of various trees, as the willow, elm, and cherry, for their protection, but disperse after they have once or twice changed their skin.

The Great Tortoiseshell Butterfly is closely related to the Small Tortoiseshell (V. Urticæ), one of the most common of our British species, and of which the caterpillar, of a blackish colour, with yellow stripes, is found in abundance on the nettle.

5. The Small Tortoiseshell Butterfly (Vanessa Urticæ). A description of this butterfly, to which we have just alluded, and which is so common and so well known, is scarcely necessary. It is abundant not only in England, but on the adjoining continent, and is conspicuous for its beauty and the lightness with which it flits from flower to flower. Two broods occur every year—one early in spring, the other in autumn. It closely resembles the preceding species, but is much smaller, and has the base of the hinder wings black. Every nettle-bed abounds with its caterpillars, which are spiny.

In Italy this butterfly continues on the wing during the winter, in fine weather; and in our island numbers, as it would appear, pass that season in a torpid condition, issuing from their retreats in February or March, when the sun breaks forth cheerfully, soon perhaps to be be-clouded. Hence the expression of Linnæus respecting this species—"fallax veris indicium" (a deceitful harbinger of spring).

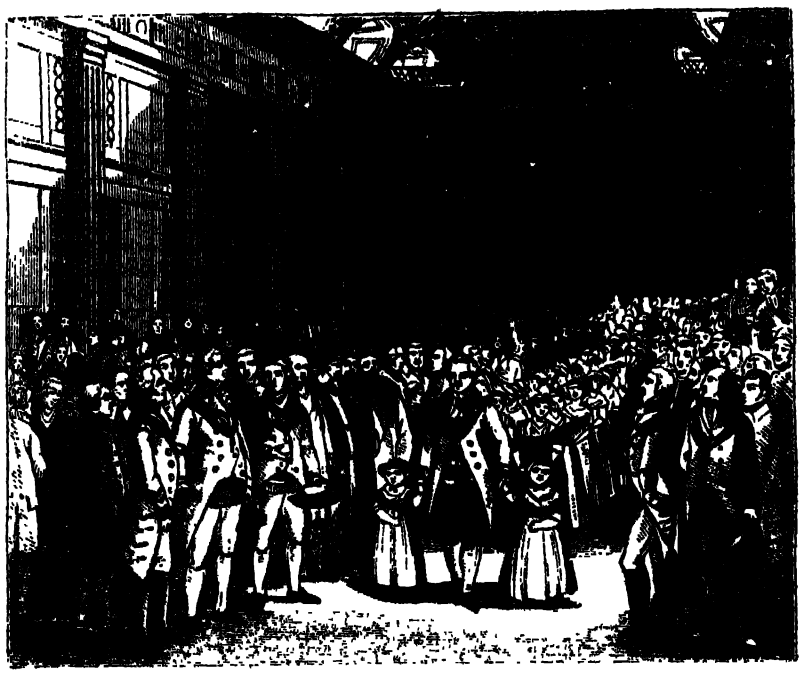
6. The Red Admiral (Vanessa Atalanta). Beautiful is this butterfly, with its velvet-black wings broadly banded with red, and relieved by white and blue. In all parts of our island it is very common, as well as over Europe, and the districts of Africa bordering the Mediterranean: it is also found in the United States of America. This insect, says the clever writer of the 'Journal of a Naturalist,' rarely "appears until late in September, and then so fresh and perfect in its plumage as to manifest its recent production from the chrysalis. In some years they abound, and one may see twenty of these beautiful creatures expanding and closing their brilliant wings under the fruit-trees on our walls, or basking on the disc of some autumnal flower." "Many of our butterflies are produced by successive batches supplying the places of those which have been destroyed, and here it is difficult to mark the duration of an individual; others, as the Nettle, Peacock, and Wood-Tortoise, in many instances survive the winter hidden in some recess or sheltered apartment, appearing in spring-time worn and shabby. But V. Atalanta appears only in the autumn, not as a preserved creature, but as a recent production; and hence we can ascertain the duration of its life to be comprised only within the period of September to the end of October; by which time its food in our gardens has disappeared. Some sheltered wall garnished with the bloom of ivy may prolong its existence a little longer, but the cold and dampness of the season soon destroy it, and hence is the life of this creature, the most beautiful of our lepidopterous tribes, of very brief duration.

The caterpillar of the red admiral (or Admirable of some writers) is solitary, spinous, and greenish, with a lateral line of yellow spots. It feeds on the nettle, and draws the leaf close round it to protect it both from the weather and the ichneumon fly: when the leaf is exhausted, it changes its skin, shifts to another, and webs that together as before. When it has grown so large that one leaf will not cover and feed it, it creeps to the top of the nettle, webbing up the leaves, within which it lies feeding till the time for assuming the chrysalis state draws nigh. In August it fastens itself by the tail within the web under the nettle-tops, changes to a chrysalis, and in fourteen days emerges a perfect

butterfly, known by the broad scarlet band across the anterior wings, and the broad red border of the hinder wings.

7. The Peacock's-Eye (Vanessa Io). The colour of this well-known species is deep brownish red inclining to purple, with a large eyelike spot on each wing above: beneath (as in the figure) the wings are dark shining brown, traversed by fine undulating lines of black.

In the south and midland counties of England this beautiful species is very common, but it is more rare in the north, and seldom seen in Scotland. It usually appears in July, flitting about hedgerows, along shaded lanes, and about the borders of copses, alighting every now and then to sun its wings, and again starting off on its aërial excursion. The caterpillars are found on the nettle, and are gregarious; they are beset with spines, and are of a black colour with white spots, and the hinder legs ferruginous. They enclose themselves in a web, drawing the leaves close around them, and having changed their skin, remove to another quarter, and again form a new domicile; and so on till nearly ready to assume the chrysalis state; they then forsake the web, and feed separately: the chrysalis is greenish yellow, with ten dents, and bifid behind. In about three weeks the butterfly issues forth, disporting amidst the flowers of our meads and woodlands.



[Procession of Freemasons' Orphans at Freemasons' Hall.—From Stothard.]

ANCIENT AND MODERN CHARITIES.

THERE are some curious matters connected with charitable bequests which are deserving of notice, in some cases for the oddness of the bequest itself, and in others as illustrative of ancient manners or customs, or as explanatory of obsolete or local appellations. We shall mention a few of these; but it may be previously worth while to state, that, according to the last Report of the Charity Commissioners, the present amount of income arising from charities in England and Wales is 1,209,395*l*., a large sum, the greater part of which is applied to the endowment of almshouses for the lodging and maintenance of the aged or infirm poor, or for stated distributions of money, clothing, or food to those who are in want of such assistance in particular districts. The income arising from bequests for purposes of education amounts to 312,544*l*., of which the income of endowed grammar-schools is 152,047*l*., of schools not classical 141,385*l*., and of bequests for general purposes of education 19,112*l*. In addition to the above sums, the amount raised for somewhat similar purposes by voluntary contribution is very large. In London alone, the establishments for the education and support of orphan children, one of the most unexceptionable forms of benevolence, are very numerous, but frequently assume an air of exclusiveness that is more curious than really objectionable. Thus we have institutions for the orphans of Clergymen, for those of natives of Wiltshire, Westmoreland, Yorkshire, and perhaps some other counties, for those of bakers, publicans, &c., and for those of Freemasons, of which the exhibition of the children at the annual dinner is represented above.

Some bequests made for the advantage of the public in particular places have become obsolete in consequence of modern improvements. For example, John Wardall, in 1656, left a tenement to the Grocers' Company in London, for the purpose of making a yearly payment of 4*l*. to the churchwardens of St. Botolph's, Billingsgate, in order to provide a lantern of iron and glass, with a candle, that passengers might go with more security to and from the water-side all night long. The lantern was to be fixed at the north-east corner of the church of St. Botolph, and 20*s*. was to be paid to the sexton for taking care of the lantern. For a similar purpose John Cooke, in 1662, left 20*s*. a year for a lantern, with a candle which was to be "of eight in the pound at least," to be hung out at the corner of St. Michael's Lane, next Thames Street, from nine o'clock at night to four or five in the morning.

In the parish of Biddenham, in Bedfordshire, there

is an ancient annual payment of 5*l.* out of an estate formerly belonging to the family of Boteler, which has since become the property of Viscount Hampden. The sum is regularly paid on St. Thomas's Day to the overseers of the poor, and is applicable by the terms of the original gift, or by long-established usage, to the purchase of a *bull*, which is killed, and the flesh distributed among the poor of the parish. For many years past the annual fund being insufficient to purchase a bull, the deficiency has been made good out of the rents of land which belonged to Mrs. Elizabeth Boteler, and which she left for charitable uses to the poor of Biddenham parish. Some years ago it was proposed by the vicar that the 5*l.* a year should be laid out in buying meat, but the poor insisted on having their bull, and the usage is accordingly kept up. The price of the bull has varied of late years from 9*l.* to 14*l.* The churchwardens, overseers, and principal inhabitants assist at the distribution of the meat, the larger portions being given to those who have the largest families.

Lysons, in his 'Environs of London,' vol. iii., p. 341, speaking of some lands which were bequeathed by two maiden gentlewomen to the parish of Paddington, for the purchase of bread, cheese, and beer, to be distributed among the inhabitants on the Sunday before Christmas Day, states, that they are now let for 21*l.* per annum, and that "the bread was formerly thrown from the church-steeple to be scrambled for, and part of it is still distributed in that way."

In the township of Setmurthy, in Cumberland, the maintenance of the schoolmaster consisted chiefly of his *whittle-gait*, as it was called, which means, that he was entitled to use his knife (for forks were not then in use) at the tables of certain of the inhabitants of the parish or township. Whittle is an old English name for a knife. Chaucer, speaking of the Miller, says,

"A Sheffield thwhytle bare he in his hose."

In the north of England the word is still in use, and *whittling* is synonymous with cutting. Twenty of the inhabitants of Setmurthy, in 1723, entered into an agreement to pay certain annual sums to the schoolmaster, and to keep him a certain number of weeks each. The total amount paid to him was 36*l.*, the money payments being 36*s.* The whittle-gait, in its practical application, has long been given up, but the amount was collected by the overseers from the owners of the several tenements which were liable according to the agreement, and was paid over to the schoolmaster; but about forty years ago the overseers ceased to make the collection, and the whittle-gait as we believe it is still called, has since been collected by the schoolmaster himself. But schoolmasters were not the only persons in the north of England who were entitled to whittle-gait. In a note in Mr. Park's copy of Bourne and Brand's 'Popular Antiquities,' it is stated that "Crossthwaite Church, in the vale of Keswick, in Cumberland, hath five chapels belonging to it. The minister's stipend is 5*l.* per annum, and *goose-grass*, or the right of commoning his geese; a *whittle-gait*, or the valuable privilege of using his knife for a week at a time at any table in the parish; and lastly, a *hardenel sark*, or a shirt of coarse linen."

Another mode of remunerating schoolmasters in the north of England arose out of the brutal game of cock-fighting, which schoolmasters even in those rude parts of England have now ceased to encourage. This kind of remuneration was called *cock-penny*. In the free-school of the parish of Crossthwaite in Cumberland, all children born in the parish are admitted and educated free of expense. Cock-pennies used to be paid to the master by the boys at Shrovetide, at which time there was a cock-fight close to the school, when a great scene of confusion and riot took place. The cock-fight and the payment of the cock-penny were both abolished when the rent of the school-land increased so as to afford a sufficient remuneration to the master without such payment.

The danger of losing themselves, to which travellers were formerly exposed from the want of good roads, even in the neighbourhood of a large town like Oxford, is shown by John Cary's bequest of 10*s.* to the corporation of New Woodstock to be paid on Lady-day yearly to the clerk or sexton of the town, or such other person as should be appointed to ring at night the eight o'clock bell, for the guidance and direction of travellers; and in case they should refuse or neglect to ring the bell in manner aforesaid, then the said 10*s.* should cease to be paid to the mayor and commonalty, and should remain to the use of John Cary, his heirs, and assigns, till some person should be appointed to ring the said bell who should duly ring it.

There lived at Barnes in Surrey, one Edward Rose, who died on the 18th of December, 1652: in order to perpetuate the odour of that sweet name of Rose, after directing his body to be buried in the churchyard of Barnes, he bequeathed 5*l.* for making a frame or partition of wood in the churchyard where he had appointed his burying-place, and ordered three rose-trees or more to be set or planted about the place where he should be so interred. He then bequeathed 20*l.* to be laid out in the purchase of an acre of land for the use of the poor of the parish of Barnes; but at the same time stipulated that out of the proceeds of this acre of land, his rose-trees should be preserved, or others planted in their places, from time to time, as they should decay. The rents are laid out in purchasing bread for the poor, but Rose's rose-trees seem to have been suffered to die off.

Griffith Amerideth was anxious for the decent interment of the bodies of criminals who should be executed at Ringswell in Devonshire. Ringswell is situated near the village of Heavitree, and was the usual place of execution for criminals adjudged to suffer death for offences committed in the county of Devon or city of Exeter. Griffith Amerideth, by his will, dated January 3, 1556, directed that the profits of his lands and tenements in Sidford, Silbury, and Salcombe, being of the value of 38*s.* or thereabouts, should be received by the mayor of the city of Exeter and his successors, the profits to be bestowed for ever towards the buying of shrouds for prisoners which should suffer at Ringswell, and for the maintenance of the wall which should be made, and should compass the ground that should be hallowed there for the burial of the prisoners; and also for the maintenance of the chapel, if any should be built there.

From a feeling probably akin to that which actuated Amerideth, Robert Dowe gave 50*l.* on the 8th of May, 1705, in his lifetime, to the end that the vicar and churchwardens of St. Sepulchre's, London, should, for ever, previously to every execution at Newgate, cause a bell to be tolled, and certain words to be delivered to the prisoners ordered for execution, in the form and manner specified in the terms of his gift, as set forth in the old will-book. An annual sum of 1*l.* 6*s.* 8*d.* in respect of this gift is charged upon the parish estate in West Smithfield. It is paid to the sexton, who employs a person to go to Newgate on the night previous to every execution, where he offers to perform the prescribed duty, which, however, is always declined, as all needful services of that kind are performed within the prison.

Richard Hudson, who seems to have been the proprietor, perhaps the landlord, of the Swan Inn, Holborn Bridge, London, manifested a more cheerful disposition than the two testators just mentioned. By his

will, dated Oct. 19, 1558, he gave out of the rents of the Swan 4*l.* per annum; 3*l.* 13*s.* 4*d.* to be distributed among the poor of the parish of St. Sepulchre, London, and the remaining 6*s.* 8*d.* to be spent in "a recreation or drinking by the vicar and churchwardens," who were appointed to distribute the donation.

In the parish of Aldridge in Staffordshire a custom formerly existed for the rector, on every Christmas-day, to give to every person in his parish who would then come to his house as much bread, beef, mustard, and vinegar as he could eat. This custom has been discontinued for many years, and instead of it the rector gives six-pence to every housekeeper in Aldridge who demands it; to every housekeeper in Barr who makes a similar demand he gives eight-pence. The money so given is called "Custom-Money." The origin of the custom is unknown.

At the extremity of Stammergate in Ripon, Yorkshire, stands "The Hospital of St. Mary Magdalen," which consists of a building containing six separate apartments on one floor, for the same number of poor women, called Sisters, with a garden in front, a small field adjoining, and a chapel at a little distance, on the opposite side of the street. The members of the institution are a master, a chaplain, and six sisters. By an inquisition on the state of the hospital, taken in the tenth year of Edward II., it was found that there ought to be, according to the form of the foundation, two chaplains in the hospital to perform divine service; but during the whole time of Nicholas de Molyns, then master, the chauntry of one chaplain was withdrawn by him; that strangers, mendicant clergy, or other indigent persons happening to travel that way, ought to have a bed and provisions for one night, but at that time none had that benefit, but went away *vacuâ manu* (empty-handed); that every year, on St. Mary Magdalen's Day, *a farthing loaf* (the quarter of wheat being then worth five shillings) and a herring should be given to every poor person that came; but during the time of Nicholas de Molyns that charity was withdrawn, and in place of it he gave poor people who came on that day a saltseller (salsarium) of beans or meal, but the greater part of the poor got nothing.

USES OF THE ELM-TREE.

THE English elm is characterized by Mr. Selby as a tree which "not only forms the avenues of the finest public walks and drives in the vicinity of towns and cities, and enters largely into the proportion of the trees which surround the residences and adorn the parks of our nobility and gentry, but is also the common and prevailing hedgerow timber in many districts, among which we need only to particularize the valleys of the Thames and the Severn."

The employment of the elm as an avenue-tree is perhaps scarcely to be included among its "uses," in the common acceptation of the term; but the custom is so generally prevalent as to deserve a few words of remark. The elm owes its selection for this purpose probably to its tall regular growth, the branches being subordinate to its straight continuous trunk, and to its magnitude and majestic growth. Different writers, however, such as Gilpin and London, have expressed different opinions on these matters; and the rules of taste are not sufficiently defined to settle *why* such and such trees are deemed beautiful. Mr. Loudon, however, attributes the fitness of the elm for an avenue-tree to the following qualities:—Rapidity of growth, straightness of trunk, facility for topping, denseness of foliage, hardness, longevity, and requiring very little care or pruning. In treating of this tree, in No. 633, we have alluded to some of these avenues, and there seems evidence that such avenues, or at least rows of elms, were prevalent in the Anglo-Saxon times; for there are more than forty places in England mentioned in Domesday-Book, in which the word "elm" is a component part of the name, such as Barn Elms, Nine Elms, &c.

The elm-timber required for the keels of ships being of very large dimensions, we are prepared to expect that many giant trees of this kind have at times been the objects of individual description; and such is, indeed, the case. In that valuable storehouse for such information, Loudon's 'Arboretum,' as well as in other works on forest-trees, we meet with many curious details on this point. In the number already mentioned we have enumerated some examples, and shall only add here one or two more of the most remarkable. On the Brighton road stands a tree called the Crawley Elm, whose trunk measures the enormous size of sixty-one feet in circumference at the base. The trunk is hollow throughout, and has a door fastened by lock and key: but on certain festive occasions the neighbours meet and regale themselves within the tree, which will conveniently hold a dozen persons at a time. A child is even said to have been born in this tree, and the mother to have lived there for several days. Two centuries ago there was an elm at Hampstead, withinside whose trunk was a winding staircase thirty-three feet high, with a turret at the top capable of holding twenty persons. In the county of Kildare stood an elm which, till the year 1762, was deemed the finest in the world. The diameter of the head, taken from the extremities of the lower branches, exceeded thirty-four yards; but in the end of that year the two principal arms fell from the trunk in one night, apparently from their own weight, as the weather was perfectly calm. The timber contained in these branches sold for five guineas. In this situation the tree continued till the winter of 1776, when a violent storm tore up the whole by the roots, with a great mass of soil and rock adhering to them. Some time previous to this, the trunk had been carefully measured, and was found to be thirty-eight feet and a half in circumference. It had been hollow for some years.

The wood of the elm is of a brownish colour, and is hard and fine-grained. In ship-building it is used for forming the blocks and 'dead-eyes' and other wooden furniture of rigging, being particularly suitable for these purposes from its hard and adhesive nature, and indisposition to crack or split when exposed to sun or weather. The most important use of it, however, is for the keels of ships. The wood for this purpose is brought to the form of a quadrangular beam, higher than wide, and with a 'scantling,' or scale of general dimensions, depending on the size of the ship. If the length of keel is not very great, the whole is made from one piece; but if this be impracticable, two or more pieces are scarfed at the end, and strongly bolted and clinched together, being further strengthened and supported by a lower piece called the 'false-keel.'

Elm is frequently used for the naves of wheels: in London it forms the usual wood for coffins. It has been from time immemorial used for water-pipes or troughs, for conveying the water of the salt-springs to the large boxes or pans where the watery particles are evaporated by the heat of the sun or by fire, and the salt deposited. It has been surmised that the term "wych" elm, originally applied to many kinds of elm, is due to the use of elm for this purpose, as the Anglo-Saxon word *wych* implies a salt-spring (whence Droitwich, Nantwich, and other places where salt is procured). The wood of elms that have been frequently pruned becomes knotted; and such wood, when polished, is very ornamental. To obtain it the trees in France are sometimes kept topped, and headed down every three

or four years. The variety called the 'twisted elm' is also much esteemed in this respect, as are also the monstrosities, or knobs, found occasionally on all the species of elm, and which, when cut into thin slices and polished, are used largely by cabinet-makers as a veneer. A mode is described of preparing the wood of the elm for cabinet-makers, and giving it the colour of mahogany. This consists in sawing the wood into thin planks, and then boiling it for an hour or more, till all the sap is extracted. The planks are afterwards wiped dry with coarse cloths, and laid in piles alternately with layers of deal laths placed across the boards at regular distances; about ten or twelve boards being thus placed one upon another, and a heavy weight being placed on the topmost. In this way the boards dry without warping, and are afterwards washed in aquafortis, when they are ready for the dye. This dye consists of two drachms of powdered dragon's-blood, one drachm of powdered alkanet-root, and half a drachm of aloes; these ingredients being steeped in half a pint of spirits of wine. The tincture is applied with a sponge two or three times, according to the depth of colour required; and the wood, thus dyed, is prepared for the usual process of polishing.

As fuel the wood of the elm is rather inferior to that of beech; as it is likewise in respect to charcoal. The ashes of the elm are rich in alkali; this tree occupying, in this respect, the tenth place in a list of seventy-three trees. The leaves and young shoots were used by the Romans to feed cattle, and they are still so employed in many parts of France. They have in some places been given to silkworms; and in both France and Norway they are boiled to serve as food for pigs. In some parts of Russia the leaves are said to be used as tea. The bark is sometimes applied as an astringent medicine; and the inner bark, like that of the lime, is employed for making nets and ropes. Both the outer and inner bark and the leaves are said to yield a substance which serves for glue. Young deer are very fond of the bark; and in Norway it is kiln-dried and ground with corn to make flour for bread.

Most of the above details relate to the common or English elm. A few words may now be said concerning the Scotch or mountain elm, called also the "wych" elm.

The Scotch elm has not so upright a stem as the English, and it soon divides into long, widely-spreading, somewhat drooping branches, forming a large spreading tree. Gerard says that from the leaves somewhat resembling those of the hazel, the Hampshire people were in his time accustomed to call the wych or Scotch elm "witch-hasell;" and he adds, "Old men affirm that when long-bows were in use, there were very many made of the wood of this tree; for which purpose it is mentioned in the English statutes by this name of witch-hasell." The timber of this kind of elm has been long considered, in Scotland and Ireland, as next in value to that of the oak, and it has accordingly been extensively introduced into artificial plantations.

In the time of Gerard the wood of the wych or Scotch elm was not only made into bows, but its bark, which is so tough that it will strip or peel off from the wood from one end of a bough to the other without breaking, was made into ropes. The wood was not considered so good for naves as the wood of the common elm, which then, as now, was considered superior in toughness and in strength, though the former cleaves better. Scotch elm timber is extensively used by the ship-builder, the boat-builder, the block and pump-maker, the cartwright, the cabinet-maker, and the coachmaker. The tree when grown up has generally a slight bending in the stem, which renders it very fitting for floor-timbers of vessels. A contributor to the 'Gardener's Magazine' states that this timber "is good for the naves, poles, and shafts of gigs and other carriages; and from its not splintering, as the oak and ash do in time of battle, for swingle-trees of great gun-carriages. It is also used for dyers' and printers' rollers, the wood by constant use wearing smooth. Cartwrights employ it for shafts, naves, beds, rails, and standards for wheelbarrows; and the handles of spades, forks, and other agricultural implements."

If we were disposed to term a superstitious employment of the Scotch elm one of its "uses," then there is a curious example of such a use occasionally exhibited. In many parts of the country the wych-elm, or 'witch-hazel,' as it is still often called, is considered a preservative against witches; probably from the coincidence between the words wych and witch; and in some of the midland counties, even to the present day, a little cavity is made in the churn, to receive a small portion of witch-hazel, without which the dairy-maids imagine that they would not be able to obtain butter.

There is a species called the American elm, of which the bark is said to be easily detached during eight months of the year; and when so detached, it is soaked in water, rendered supple by pounding, and employed in the northern states of America in the form of shreds or ribands, for weaving into seats for common chairs, as rushes are in England. Another American kind, called the Red elm, yields leaves and branch-bark, which when macerated in water give a thick and abundant mucilage, used as a refreshing drink for colds and for emollient plasters.

The Pasturage of Bees.—Next to the situation of the bee-hive is the consideration of the bees' pasturage. When there is plenty of the white Dutch clover, sometimes called honeysuckle, it is sure to be a good honey year. The red clover is too deep for the proboscis of the common bee, and is therefore not so useful to them as is generally thought. Many lists have been made of bee-flowers, and of such as should be planted round the apiary. Mignionette, and borage and rosemary, and bugloss, and lavender, the crocus for the early spring, and the ivy flowers for the late autumn, might help to furnish a very pretty bee-garden; and the lime and liquid umber, the horse-chestnut, and the sallow, would be the best trees to plant around. Dr. Bevan makes a very good suggestion, that lemon-thyme should be used as an edging for garden-walks and flower-beds, instead of box, thrift, or daisies. That any material good, however, can be done to a large colony by the few plants that, under the most favourable circumstances, can be sown around a bee-house, is, of course, out of the question. The bee is too much of a roamer to take pleasure in trim gardens. It is the wild tracts of heath and furze, the broad acres of bean-fields and buck-wheat, the lime avenues, the hedgerow flowers, and the clover meadows that furnish his haunts and fill his cell. Still it may be useful for the young and weak bees to have food as near as possible to their home; and to those who wish to watch their habits, a plot of bee-flowers is indispensable.—*Quarterly Review.*

The Kiwi.—A bird of such anomalous structure as the Kiwi, differing as it does from all other birds, although most nearly related to the Struthious order, and having habits peculiar to itself, had attracted my most eager attention. It is now rapidly becoming extinct. If it be true that, as the natives assert, the kiwi is found on Little Barrier Island, which is uninhabited, and is situated about nine miles from the main—this fact would give rise to curious geological speculations. How did a bird which cannot fly—for its wings, so to speak, are nothing but small crooked appendages, each about an inch and a half long, and terminating in a claw—come across the sea to that island? It would appear that no other answer can be given than that the island was formerly connected with the main. The kiwi, or kiwi kiwi, as it is called by the natives, inhabits the deepest recesses of the forest. Here, where gigantic trees are interwoven

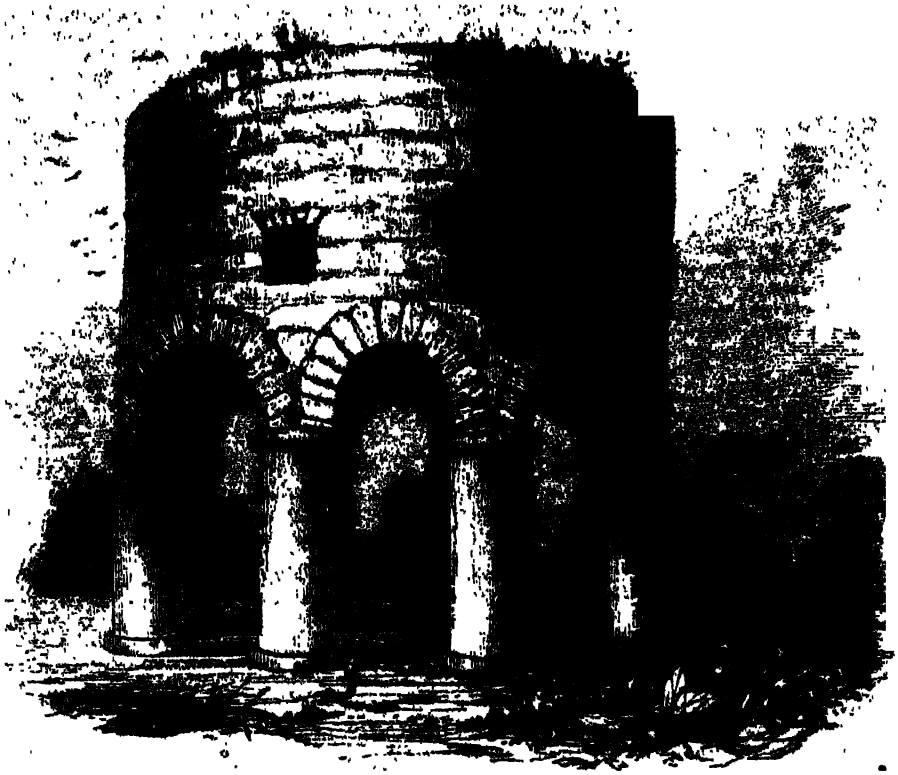
almost impenetrably with climbers, and where in the indentations of the mountains are formed small open and swampy spots, covered by bulrushes and tufts of a high carex, or a Liliaceous plant, the Hamelinia veratroides, is its favourite resort. Here it hides itself in the hollows of trees during the day, being a truly nocturnal bird. It generally lives in pairs, male and female, one pair occupying a certain district. As soon as night sets in, it leaves these hiding-places in search of food: this consists of the larvæ of coleopterous and lepidopterous insects, which it scratches out with its powerful feet, or turns up with its long slender beak. But insects seem not to be its only food, as seeds have been found in its stomach. Little is known as to the nidification and incubation of the kiwi; but I have ascertained the following particulars from the natives:—They say that it burrows with its feet, and hollows out to a greater extent excavations already existing under the roots of trees; and in them, on a single layer of grass, it lays one egg of a greenish colour, and as large as a turkey's egg. They also assert that the male and the female hatch alternately. Their notion as to the period of incubation is rather curious, as they say that the birds sit for several months upon the egg. During the night, the shrill cry of the kiwi is often heard; the male utters the sound *koire, koire, koire*; the females, *ho, ho, ho*. By imitating these notes, the natives decoy the kiwi, and catch them with the help of a dog, or bewilder them by suddenly displaying a torch made of the resinous hauri-pine, by which plan they catch them alive. A violent struggle generally ensues between the dog and the bird, in which the kiwi uses its powerful legs with great effect. It is said to be very swift in running, although its feet do not seem better adapted for that purpose than that of the common fowl. Formerly, the kiwi served the natives for food; it is very fat at some seasons, and its flesh is said to be well-tasted; its skin, which is remarkably strong and tough, especially along the back, was sewn together, and formed highly valued mats. Never having seen one of these mats, I readily concluded that the bird itself had become very scarce. I possess, however, fish-hooks, to which the feathers of the kiwi are attached as artificial flies; and to that purpose they are well adapted.—*Dieffenbach's Travels in New Zealand.*

Bees in Surinam.—On the 16th I was visited by a neighbouring gentleman, whom I conducted up my ladder; but he had no sooner entered my aërial dwelling than he leaped down from the top to the ground, roaring like a madman with agony and pain, after which he instantly plunged his head into the river; but, looking up, I soon discovered the cause of his distress to be an immense nest of wild bees, or *Wassee Wassee*, in the thatch immediately above my head, as I stood within my door, when I immediately took to my heels, as he had done, and ordered them to be destroyed by my slaves without delay. A tar-mop was now brought, and the devastation just going to commence, when an old negro stepped up and offered to receive any punishment I should decree, if even one of these bees should sting me in person. "Massa," said he, "they would have stung you long ere now had you been a stranger to them; but they, being your tenants, that is, gradually allowed to build upon your premises, they assuredly know you and yours, and will never hurt either you or them." I instantly assented to the proposition, and tying the old man to a tree, ordered my boy Quaco to ascend the ladder quite naked, which he did, and was not stung. I then ventured to follow; and declare, upon my honour, that even after shaking the nest, which made the inhabitants buzz about my ears, not a single one attempted to sting me. I next released the old negro, and rewarded him with a gallon of rum and four shillings for the discovery. The swarm of bees I since kept unhurt, as my body guard, and they have made my overseers take a desperate leap for my amusement, as I frequently sent them up my ladder on some frivolous message, which I wished to punish them for injustice and cruelty, which was not seldom.—*Cotton's Bee-Book.*

Commerce among the Ancient Romans.—I know of only one fact which seems to indicate the existence of a commercial spirit amongst the Romans at the period with which we are now engaged (the third century A.U.C.). The commercial spirit of the Romans had no time to develop itself; the invasion of Hannibal was fatal to the security, and much more to the acquisition, of capital; and after the struggle was over, society had undergone a change, which fixed the attention of the people on other objects. Trade therefore contributed but little to the greatness of Rome; indeed, it is ridiculous to speak of the trade of a country where some of the simplest callings were as yet unknown, and where silver money had been coined for the first time only five years before the first Punic war. Were the manners of Rome then as pure as those writers would imagine, who consider an agricultural people to be placed in so much healthier a moral condition than a commercial or manufacturing one? Undoubtedly the Roman character, before the second Punic war, was full of nobleness; but it is idle to connect its excellence with the preference given to agriculture, rather than to trade. The Roman people were as yet in the youth of their existence; and their minds enjoyed a youthful freshness. They had not lost the feelings of admiration and veneration; feelings which knowledge and experience, inasmuch as their field is an evil world, surely lessen; feelings whose destruction is the worst degradation of human nature.—*Arnold's Rome*, vol. iii.

New Zealand Superstitions.—Man, according to the notions of the natives, is endowed with an immortal, incorporeal spirit, which at his death departs from the body, and goes as a falling star to the nether world, the entrance to which is down the face of a rocky cliff at the Cape Maria van Diemen. An ancient tree stands there, upon the branches of which the spirit descends. The natives hold this place in great awe and veneration; and even Christian natives who accompanied me would not go near it. But the spell has been partially broken by a missionary cutting off the branch of the tree on which the spirit was supposed to alight. In the interior the natives still adhere to their ancient notions. The lower world is the common dwelling-place of spirits, but it is not the only one. Before the spirit of an hereditary chief descends into it, it goes into Heaven; there his left eye remains, and becomes a star. In the lower world the spirits live as men do on earth; but they cannot leave it, and influence the actions and the fate of those who are alive, communicating with them through the medium of the priest, who hears them. Their voice has a whistling sound, which others besides the priests sometimes perceive, when they walk out in the dark. If travellers come into the neighbourhood of the infernal regions, they throw down a piece of fern or of the alikawpalm, to let the spirits know whether the wanderers are inhabitants of the open land or of forest. The spirits often speak in dreams to the priest or chief, who announces their communications in the morning; and these often lead to important resolutions. The belief in dreams is universal, and the commands given in that way are implicitly obeyed, and often influence their most important actions.—*Dieffenbach's Travels in New Zealand.*

A Christian Community.—The St. Kilda community may in many respects be regarded as a small republic, in which the individual members share most of their worldly goods in common; and, with the exception of the minister, no one seems to differ from his neighbour in rank, fortune, or condition. Indeed a peculiar jealousy is alleged to exist on this head, no man being encouraged to go in advance of those about him in anything, which of course must be a drawback on improvement. However, many kind and Christian features are engrafted on the system, such as widows and orphans, or others unable to maintain themselves, being supported by the community, in equal proportions. They are frequently very ill off during stormy weather, or those periods of the year in which the rocks are deserted by their winged inhabitants. Their slight supply of oats and barley would scarcely suffice for the sustenance of life; and, such is the injurious effect of the spray in winter, even on their hardiest vegetation, that savoys and German (or curly) greens, which with us are improved by the winter's cold, almost invariably perish soon after the close of the autumn. This, however, is not owing to the rigour of the climate, but to the saltness of the spray which the boisterous winds of winter carry up from the turmoil of the raging shores, and spread upon the surrounding vegetation. This the minister has endeavoured to prevent by having recently raised a stone dyke of ten feet high around a small enclosure in which his cabbages lie ensconced. In other respects, in truth, the climate is extremely mild, the ice which is formed, even during the coldest night in winter, being scarcely thicker than a penny, and usually melting away, if the sun is at all visible, in the course of the ensuing day.—*Wilson's Voyage round the Coasts of Scotland.*



[Ancient Tower at Newport, U. S.]

ANCIENT BUILDING IN NORTH AMERICA.

The readers of Cooper's novels will without doubt remember a scene near the beginning of his 'Red Rover,' which is represented as occurring at Newport, in Rhode Island, in a small ruined tower or circular building standing on rude pillars connected by arches, which he says might have been constructed in the infancy of the colony as a place of defence, but which the townspeople were of opinion had been formerly a mill. The Royal Society of Northern Antiquarians established at Copenhagen have recently published some views of this ancient structure, from one of which, somewhat enlarged, our woodcut is taken; together with a description sent from Boston by Dr. Webb of that place, who is inclined to think it a genuine relic of the ancient Scandinavians, the ante-Columbian discoverers of America. Proofs of the early occupation of the western shores of that continent by those intrepid mariners have been zealously accumulated by the Society, and much of the documentary evidence of their discoveries at the close of the tenth century carefully edited and published, and an abstract of which we have given in No. 733. The building in question is placed upon the most likely spot in Vinland for the settlement of a maritime people.

Dr. Webb describes the building as situated near the summit of the hill upon which the upper part or rear of the town of Newport stands; he states that it is built of rough pieces of greywacke stone, laid in courses, strongly cemented by a mortar of sand and gravel of excellent quality, which nearly equals the stone itself in hardness; and that it appears to have been at some former period covered with a stucco of similar character to the cement with which the stone is held together. It is nearly twenty-five feet in height; its diameter outside is twenty-three feet, and inside eighteen feet nine inches. It is circular, and is supported upon eight arches resting on thick columns about ten feet high; the height of the centres of the arches from the ground is twelve feet six inches. The foundation extends to the depth of four or five feet.

The columns are peculiar, having only half capitals, which seem to have been simply rounded slabs of stone, of which the part projecting on the inside had been cut away; hollows are formed in the interior of the walls at some little height above the arches, as though intended to receive the ends of beams and rafters to support a floor, which formerly was there, according to the testimony of some of the older inhabitants of Newport, and which is supposed in the scene described by Cooper. The building is pierced by two windows, one of which is seen in the woodcut. The tradition of the town is, that it had once a circular roof, and that it had been used successively as a windmill, a place for stowing hay, and a powder-magazine.

Professor Rafn, the secretary of the Society of Northern Antiquarians, in a notice of this building, argues, from the complete absence in America of any work of similar nature to that under consideration, and from the resemblance which it bears to some other buildings of the Scandinavians in Europe, that this must be a genuine relic of the ante-Columbian colonists; and he reasonably enough accounts for the absence of many such remains by the circumstance that the country abounded in wood, a material which was in those ages, and is even now, preferred for building throughout the extensive regions inhabited by the Scandinavians, whose wooden houses and churches are mentioned by all travellers in Norway and Lapland; while the many remains of stone buildings by the same people found in Greenland, which must have been nearly contemporary with the ante-Columbian descent-

tion of America, only show that stone was the only available material for building in that arctic country, where the little wood used is stated in the ancient chronicles of Iceland to have been imported from America (Vinland), or found on the opposite shore of Baffin's Bay, where drift-wood is said to accumulate much more than on the coast occupied by the colonists from Denmark.

Professor Rafn remarks, on the architecture of the building, that it is in the ante-Gothic style, which was common in the north and west of Europe from the eighth to the twelfth centuries; the circular form, the low columns, their thickness in proportion to their distance from each other, and the entire want of ornament, all point out this epoch. He gives plates of three churches in Denmark, in corroboration of his opinion: the first is that of Vestervig in Jutland, founded in 1110, in honour of St. Theodgar; the second is that of the crypt under the cathedral of Viborg, of near the same date; the third is the church of Biernede, near Sorö in Sicaland, built in the middle of the same century. In all these, the low columns and arches, with the circular arrangement, are quite in the style of the American edifice, although the latter has less ornament of any kind. He cites, moreover, four churches in Biornholm, and one at Thoresager in Jutland, all of the circular form; as well as some ruins of circular buildings in Greenland, near the churches of Igalikko, Kakortok, and Igloraoït, which are conjectured to have been baptisteries; and this Professor Rafn supposes might have been the destination of the Newport structure, for he considers the windows and holes in the body of the building to have been additions, made in it by the recent colonists, when they converted it to a mill, a magazine, and a hay-loft.

The first certain mention of this curious relic is in the will of Governor Arnold, dated in 1678, in which he bequeaths his "stone-built windmill" with other property. This was just forty years after the island had been settled. In a journal kept by Peter Easton, one of the first inhabitants, who appears to have minutely recorded all the occurrences of the settlement, the building of the first mill in the colony is noted, under the year 1663, in half-a-dozen words; but Dr. Webb is of opinion that if this building were the one intended, it would hardly have been so summarily dismissed; doubtless concluding that a stone edifice of so much more imposing structure than any other of the colony would have demanded a more specific mention.

After what has been stated on this matter, it must appear doubtful whether or not this is a genuine relic of the ancient Scandinavian colony; there is assuredly not evidence enough of its authenticity to produce a conviction of the existence of such a colony in those who do not receive the evidence of the Icelandic Sagas before alluded to; but if these Sagas be admitted as conclusive of its existence, which we feel their circumstantiality fully deserves, then the building we have described may be added to the other evidences found in America, such as arrow-heads, bracelets, fibulæ, bronze ornaments, and even a Runic inscription, unfortunately undecypherable, as corroborative of the events detailed in those curious historical documents.

THE SOURCES AND USES OF GYPSUM.

THE names *Gypsum*, *Sulphate of Lime*, *Plaster of Paris*, and *Alabaster* refer to four substances which, however different they may appear, or to however different purposes applied, are pretty much the same. They are, it is true, subject to certain chemical modifications before one can assume the form of the other; but still Gypsum, Plaster of Paris, and one of the two varieties of Alabaster, are all Sulphates of Lime. We will shortly notice the differences between them, the sources whence they are obtained, and the principal purposes to which they are applied in the arts. One of the excellent papers in Mr. Aikin's "Illustrations" of arts and manufactures will afford valuable aid to this object.

When sulphate of lime is in a compact and crystalline state, it is called gypsum, or alabaster, or selenite, according to the subforms which it assumes; but when it occurs as a soft chalky stone, which by the application of heat gives out its water of crystallization and becomes a very fine white powder, it is called plaster of Paris, or rather, the soft stone still retains the name of gypsum, while this other name is applied to the powder produced from it.

Gypsum is found in the formation called the London clay, but not in such quantities as to be available for commercial purposes. Mr. Aikin says that he has frequently observed gypsum in situations where it is not generally looked for. For instance, when the deep cutting for the Highgate archway was made, the clods of earth as they were dug presented the ordinary uniform appearance of clay; but after exposure for a year or more to the air and the rain, they had become rough with projecting crystals of gypsum, from an eighth to a quarter of an inch in length, formed doubtless by the action of the rain on the clay, which, by dissolving the gypsum, enabled it to separate from the other ingredients by crystallization.

At Montmartre near Paris are gypsum-quarries of great celebrity, not only for the mineral which they yield, but for the imbedded fossils which enabled Cuvier to make such vast progress in the study of fossil geology. The Paris basin, or bed of clay on which the city is built, is considered to be somewhat similar to the material of the London basin, but with a larger proportion of calcareous matter. The lime or gypsum, too, has separated itself more completely from the clay than in London, and hence yields masses more fitted for quarrying. There are three or four of these beds in the Paris district, of which one is more celebrated than the rest for yielding the gypsum afterwards converted into plaster of Paris—whence the name.

In various parts of England gypsum is found in small clusters of crystals imbedded in clay. The Weald clay contains the Petworth marble; a brown clay found near Purbeck has in it a quarry of gypsum actually worked; and the Oxford clay near Shotover Hill contains crystals of gypsum. It is in the new red sandstone, however, that the greatest quantity occurs, frequently in connection either with brine-springs or with beds of rock-salt. The whole of the midland counties are more or less supplied with this mineral, varying greatly in quality in different places, and therefore fitted for very different purposes. In the more eastern counties the gypsum comes nearer to the surface than in the western, and are therefore more easily quarried. Near Newark in Nottinghamshire is found a kind of gypsum which produces finer plaster of Paris than any other either here or abroad. The Paris gypsum, which used to be preferred for plaster-casting, is found to be less white and more earthy than the Newark kind; and hence the Parisian artists themselves have come to make use of the latter. Several quarries exist near Newark, at which a large number of persons are employed.

The uses to which gypsum is applied are very varied. In early times the pure and crystalline specimens, if of large size, were used as a substitute for glass in windows. This may appear strange; but a well-formed crystal of gypsum is of a rhomboidal shape, and is capable of being split into very thin lamina,

which laminæ, being semi-transparent, may be used as substitutes for glass.

The Montmartre gypsum, and many varieties found in England, are used extensively in the preparation of mortar or cement for building purposes. Such varieties generally contain a portion of carbonate of lime, in addition to the sulphate which forms the gypsum. In order to prepare this kind of gypsum for the purposes of cement, it is necessary to apply heat enough to drive off the water of crystallization and part of the carbonic acid; and this is done at Montmartre in the following manner:—The gypsum is quarried in lumps about the size of a large clenched hand, and weighing from two to three pounds each. It is stored up for use under a shed, as great importance is attached to the gypsum going quite dry into the kiln, in order that the proportion of fuel may be duly regulated. The kiln is a space ten feet long, bounded on the two sides and one end by walls, of which the latter is the highest; the whole being built in the open air, but protected from rain. Within this space four or five longitudinal walls are built up of the most regularly shaped lumps of gypsum to the height of the outer side-walls, the intervals filled up with billet-wood and faggots, and arches of gypsum are built over them with sufficient attention to accuracy of construction that they shall not fall in when the fuel is consumed: an aperture about six inches' space is left adjoining the end wall, to produce a sufficient draught through the kiln. Over the whole of the arches or vaulted space, thin alternate layers of charcoal or dry wood and pieces of gypsum are placed to the height of eighteen or twenty inches. The kiln being thus completed, fire is applied at the front of the flues, and the heat is maintained by further supplies of billet-wood, for from twenty-four to about forty hours, according to the quantity of gypsum and the quality of the fuel, till the calcination is finished.

The gypsum so burned is often separated into three different qualities, to be applied to different purposes. The superfine consists of the picked stones, which when broken present a perfectly white appearance, free from any marl, earth, or other impure matter, and if any exist it is cut away, the stone again calcined, and finally ground to the state of the finest powder; this is used for busts, statues, and the finest and most delicate castings. The second quality is not fine enough for these purposes, but is still fitted for casting the generality of ornaments. The lowest or coarsest quality is used for plastering or "stucco" of various kinds.

The cement made of calcined gypsum mixed with sand is much used as a mortar for stone-work in Paris. When employed as a covering for floors, it is thus prepared:—it is first dried at a very gentle heat, then pulverized either in hand-mortars or in mills, and lastly boiled. This boiling is not the kind of process usually understood by this term, but consists in putting the powder by itself in an iron pot over the fire. The particles which are at the bottom are of course soonest heated, and their water of crystallization is converted into steam, which bubbles up through the mass of powder, and gives to the whole the appearance of boiling. When the water is all thus driven off, the gypsum is in a fit state for use as a plaster for floors.

The gypsum found in Derbyshire is for the most part applied to purposes very different from the above. The coarser varieties are employed in the neighbourhood of Derby for floors of cottages and farm-houses; but the better kinds are sent by canal to the Staffordshire potteries, where it is employed in making the moulds for forming some of the better kinds of earthenware, and, in a smaller degree, as one ingredient in the earthenware itself. The very finest specimens found in Derbyshire are, however, otherwise appropriated; they are reserved for ornamental purposes, being formed by carving and turning into vases, small statues, and other figures, of which great numbers are manufactured at Derby. This is one of the two kinds of *alabaster*, which produce such delicate little ornaments, having a softness of appearance and a delicate whiteness which scarcely any other material can equal. Carbonate of lime forms the harder kind of alabaster; while sulphate of lime, or gypsum, is soft, fragile, and of such delicate and sensitive colour that stains are easily produced and with difficulty removed: hence the practice of preserving alabaster specimens under glass covers. For further details respecting alabaster ornaments, we may refer to a paper in No. 425.

The employment of gypsum for figures and casts is, next to alabaster, the most delicate and pure. The operation depends on the following grounds:—When gypsum has been deprived of its water by exposure to heat, and has been reduced to a fine powder, it is capable, by mixture with water, of being brought to the consistence of a pulp; this pulp in a short time sets, or becomes solid, a very sensible degree of heat being given out by the mixture during the act of consolidation; if, therefore, the pulp be poured into a mould, it assumes on consolidating the figure of the cavity into which it had been poured.

While speaking of the Nowark gypsum used for figure-casting, Mr. Aikin mentions a gypsum-burner who was celebrated some few years ago for the extraordinary care with which he prepared the gypsum. "To such perfection in his art had this person attained, that different parcels of his plaster would not vary ten seconds in their time of setting during a period of five years or more. The gypsum was procured from Newark, and by special agreement it was quarried in dry weather, and stacked under covered sheds previous to being shipped for London. It was conveyed from the ship to Mr. Rogers's premises in decked barges, and every possible care was taken to prevent it from becoming wet. It was next sorted into three qualities. The first, or coarsest, was of a brown colour, and consisted of the outer part of each lump or block; the second was of a dingy or dirty white, and occupied the intermediate part of the block; the third, being the best or finest, was the central part." The calcining was effected in ovens, as at Montmartre, but with especial care to the production of the most perfect kind of powder.

The mechanical processes of figure-casting—including the making of the mould, the difference between *waste* moulds and *safe* moulds, the mixing of the liquid plaster, and the making of the cast—having been described in No. 419, need not be entered on here.

Gypsum is a very frequent ingredient in the water of springs and rivers, and such waters belong to the class of *hard* water; they have a flat taste, and are unfitted for washing on account of their curdling the soap. Water containing gypsum modifies the tints of animal and vegetable colours, and therefore dyers, bleachers, and the makers of colours have very different degrees of success according as the water they employ does or does not contain gypsum. The same ingredients employed in dyeing silk in London will not produce so brilliant a hue as at Lyons, because the water employed at the former is more likely to be tainted with gypsum.

Gypsum is a valuable manure. A practical writer in the 'Penny Cyclopædia,' after speaking of its use on the Continent, observes:—"In England the result of experiments with gypsum has not always been so favourable, and the use of that manure has not been so

generally adopted. In some instances the benefit was evident; in others not even perceptible. The doubt thus thrown on its efficacy has caused it to be neglected. In our opinion, the condemnation of it is not founded on solid grounds. It is allowed that in cold wet soils its effects, as also that of bones, are not very encouraging, nor in very poor soils; but in good loams containing a due proportion of humus, and on all light and dry soils which are not very poor, or have had a due portion of manure, its effects are striking. We have ourselves experienced the benefits of gypsum, not only on clover, but on peas, tares, and beans, where the soil was in good heart and well drained. The portions of a field sown with gypsum were decidedly superior in vigour and luxuriance of growth to those where it had not been used. So far we can bear testimony to its use."

Lancashire Oat-Cakes.—The Rev. J. Hay, A.M., F.R.S., in his list of North-country words, has the following in explanation of the word "Bannock?"—An oat-cake kneaded with water only, and baked in the embers. In Lancashire, and other parts of the north, they make several sorts of oaten bread, which they call by several names; as, 1. Thar-cakes, the same with bannocks, viz. cakes made of oatmeal as it comes from the mill, and fair water, without yeast or leaven, and so baked. 2. Clap-bread; thin hard oat-cakes. 3. Kitchiness-bread; thin soft oat-cakes, made of thin batter. 4. Riddle-cakes; thick sour cakes, from which differs little that which they call hand-hoven bread, having but little leaven, and being kneaded stiffer. 5. Jannock; oaten bread made up in loaves.

Harmony of Colours.—It is of some importance that the laws of harmonious colouring should not be neglected even in so simple a matter as the painting of sticks for the support of flowers. Where the habit of a plant is such as to require artificial support, the object which gives that support should as much as possible be kept out of sight; and the bright greens so frequently, indeed almost universally, used for this purpose, are therefore objectionable. Mrs. Loudon, in one of her works on gardening, recommends that pinks, carnations, dahlias, and other plants be tied to sticks painted in neutral tint, or the colour of ash poles. These colours are of a quiet unobtrusive character, and the flowers consequently display themselves to greater advantage. Flower-pots are also frequently painted in colours which offend the eye, because the colours generally used for this purpose are too glaring, and therefore tend to draw the attention of the spectator from the plant; besides disturbing that harmony which is calculated as much to gratify the eye as "concord of sweet sounds" the cultivated ear.—*From a Correspondent.*

Character of Hannibal.—If the characters of men be estimated according to the steadiness with which they have followed the true principle of action, we cannot assign a high place to Hannibal. But if patriotism were indeed the greatest of virtues, and a resolute devotion to the interests of his country were all the boldness that a public man can be expected to fulfil, he would then deserve the most lavish praise. Nothing can be more unjust than the ridicule with which Juvenal has treated his motives, as if he had been actuated merely by romantic desire of glory. On the contrary, his whole conduct displays the loftiest genius and the boldest spirit of enterprise, happily subdued and directed by a cool judgment, to the furtherance of the honour and interests of his country; and his sacrifice of selfish pride and passion, when after the battle of Zama he urged the acceptance of peace, and lived to support the disgrace of Carthage with the patient hope of one day repairing it, affords a strong contrast to the cowardly despair with which some of the best of the Romans deprived their country of their services by suicide. Of the extent of his abilities, the history of his life is the best evidence? as a general, his conduct remains unchanged with a single error. His knowledge of human nature and his ascendency over men's minds are shown by the uninterrupted authority which he exercised alike in his prosperity and adversity over an army composed of so many various and discordant materials, and which had no other bond than the personal character of their leader. As a statesman, he was at once manly, disinterested, and sensible; a real reformer of abuses in his domestic policy, and in his measures, with respect to foreign enemies, keeping the just limit between weakness and blind obstinacy. He stands reproached, however, with covetousness by the Carthaginians, and with cruelty by the Romans. The first charge is sustained by no facts that have been transmitted to us; and it is a curious circumstance, that the very same vice was long imputed by party violence to the great Duke of Marlborough, and that the imputation has been lately proved by his biographer to have been utterly calumnious. Of cruelty, according to modern principles, he cannot be acquitted.—*Arnold's Rome*, vol. iii.

Frontier Settling in America.—Take the following case as an illustration of the process that is continually going on on the frontier.—A man removes to the west; he purchases a piece of ground, builds a house, and devotes himself to the clearing and tillage of his forest acres. How long he has rescued a farm from the wilderness, and has reared a family upon it. He then divides his land among his sons, if there be enough for a farm to each of them; if not, each receives money enough to buy one, as he comes to age. Some may settle on lands bestowed on them by their father; others, preferring a change, may dispose of their portion, and proceed, most commonly unmarried, to "the frontier country," as it is called, that is, to those parts of the west where the public lands are not yet sold. There he chooses out as much as he can conveniently pay for, receiving a title to it from the district land-office, and proceeds to make for himself a home. This is likely to be in the spring. Having selected a spot for his dwelling, generally near some spring, or where water may be had by digging a well, he goes round, and makes the acquaintance of his neighbours residing within the distance, it may be, of several miles. A day is fixed for building him a house, upon which those neighbours come, and render him such efficient help, that in a single day he will find a log-house constructed, and perhaps covered with clap-boards, and having apertures cut out for the doors, windows, and chimney. He makes his floor at once of rough boards riven from the abundant timber of the surrounding forest, constructs his doors, and erects a chimney. Occupying himself, while uninterrupted in out-door work by rainy weather, in completing his house, he finds it in a few weeks tolerably comfortable; and, during fair weather, he clears the underwood from some ten or fifteen acres, kills the large trees by notching them round so as to arrest the rise of the sap, and sows the ground with Indian corn, or maize, as it is called in Europe. He can easily make, buy, or hire a plough, a harrow, and a hoe or two. If he find time, he surrounds his field with a fence of stakes. At length, after prolonging his stay until his crop is beyond the risk of serious injury from squirrels and birds, or from weeds, he shuts up his house, commits it to the care of some neighbour, living one or two miles off, and returns to his paternal home, which may be from fifty to three hundred miles distant from his new settlement. There he stays until the month of September, then marries, and with his young wife, a waggon and pair of horses to carry their effects, a few cattle or sheep, or none, according to circumstances, sets out to settle for life in the wilderness. On arriving at his farm, he sows wheat or rye among his standing Indian corn, then gathers in this last, and prepares for the winter. His wife shares all the cares incident to this humble beginning. Accustomed to every kind of household work, she strives by the diligence of her fingers to avoid the necessity of going to the merchant who has opened his store at some village among the trees, perhaps some miles off, and there laying out the little money they may have left. With economy and health they gradually become prosperous. The primitive log-house gives place to a far better mansion, constructed of hewn logs or of boards, or of brick or stone. Extensive and well-fenced fields spread around, ample barns stored with grain, stalls filled with horses and cattle, flocks of sheep, and herds of hogs, all attest the increasing wealth of the owners. Their children grow up perhaps to pursue the same course, or, as their inclinations may lead, to choose some other occupation, or to enter one of the learned professions.—*Rev. Robt. Baird's Religion in the United States.*



[The Bear at the Stake.]

HUDIBRAS.—No. III.

[Continued from page 32.]

The wordy war of which we have spoken grew hotter and more inveterate. The results were such as might have been expected. Both parties, angry and unconciliating, were possessed with the same feeling attributed to the hero in canto ii., part ii.:

> "Quoth Hudibras, 'It is in vain,
> I see, to argue 'gainst the grain;
> Or, like the stars, incline men to
> What they 're averse themselves to do:
> For when disputes are weary'd out,
> 'Tis int'rest still resolves the doubt.
> But since no reason can confute ye,
> I'll try to force you to your duty.'"

All men were now prepared to

> "Prove their doctrine orthodox
> By apostolic blows and knocks;"

and

> "Then did Sir Knight abandon dwelling,
> And out he rode a colonelling."

In what we have hitherto said, we have endeavoured incidentally to show that Butler in Hudibras depicted a class, and that he no more described a particular individual in the man than he did in the horse he placed under him,* though no doubt Sir Samuel Luke affords a few points of resemblance. A great poet does not condescend to write in riddles. Had he intended a portrait, the features would have been too distinctively marked to have been misunderstood. Indeed a most remarkable characteristic of the poem is, that though examples are selected from the non-conformist party, the satire is actually applied to vices or follies of the most general kind, in which all sects are involved, and of which all men might be participant. The ridicule is in effect thrown unsparingly on hypocrisy and pretence of whatever kind. With the exception of a very few lines upon some of the more prominent, and to a churchman the more obnoxious, tenets of their sects, the characters of Hudibras and Ralph display nothing necessarily peculiar. Royalists might have been, and many were, pedants and believers in astrology, subtle hair-splitting disputants, and greedy seekers of their own selfish purposes, cowards and boasters, with as little improbability as republicans or non-conformists. A striking example of this dexterous appropriation to his adversaries of a general and widely-spread custom is afforded in the burlesque invocation with which he preludes the first adventure of his pair of heroes. After alluding very generally to the customary usage—

> "We should, as learned poets use,
> Invoke th' assistance of some Muse;
> However critics count it sillier
> Than jugglers talking to familiar;"

he proceeds to ridicule the practice of prefacing works with commendatory verses and portraits of the authors: a practice, however, adopted by Shakspere and Milton, though doubtless imitated by many to whom the world afforded no echo of the laudations so bestowed, and takes as the representatives of the class, three writers from the ranks of the Dissenters, one of whom at least, Withers,* was infinitely superior to the Durfeys, Shadwells, and others of Butler's contemporaries:—

> "Thou that with ale, or viler liquors,
> Didst inspire Withers, Prynne, and Vickars,
> And force them, though it was in spite
> Of nature and their stars, to write;
> Who, as we find in sullen writs,
> And cross-grain'd works of modern wits,
> With vanity, opinion, want,
> The wonder of the ignorant,
> The praises of the author, penned
> B' himself, or wit-insuring friend,
> The itch of picture in the front,
> With bays and wicked rhyme upon't,
> (All that is left o' th' forked hill)
> To make men sensible without skill;
> Canst make a poet, spite of Fate,
> And teach all people to translate,
> Though out of languages in which
> They understand no part of speech:
> Assist me but this once, I 'mplore,
> And I shall trouble thee no more."

Ralph, the squire, is described as an uneducated man, but a believer in the mystical reveries of Jacob Behmen:—

> "As learn'd as the wild Irish are;
> Or Sir Agrippa,† for profound
> And solid lying much renown'd,"—

in alchemy, astrology, and the Rosicrucian lore: and as understanding

> "the speech of birds,
> As well as they themselves do words."

The remainder of his character, like that of Hudibras, is made up rather from the features of a sort than of an individual. He is implied, rather than stated, to have been an Anabaptist, though the doctrinal points of the sect are not always adhered to by Ralph, but one of the tenets of the sect was that God made

Our artist, while he has delineated as perfect a jade as ever entered a knacker's yard or a poet's imagination, has deviated in a trifling matter from the poem:

> "His draggling tail hung in the dirt,
> Which on his rider he would flirt."

his he has curtailed; but whether the defect be in the artist the author, we must leave to our readers more learned in ass-flesh than we are to decide. For ourselves, the half-starved ragged-looking tail seems the more characteristic.

* More correctly Wither, or Wyther: he had been a major in the parliamentary army.

† Cornelius Agrippa, alchemist, astrologer, and physician, a learned man, but a great quack, who died in 1535.

his will known to them by special inspiration. This was ridiculed by their opponents as the New Light:—

"By means of this, with hem and cough,
Prolongers to enlighten'd snuff,
He could deep mysteries unriddle
As easily as thread a needle.
For as of vagabonds we say
That they are ne'er beside their way;
Whate'er men speak by this New Light,
Still they are sure to be i' th' right.
'Tis a dark lanthorn of the spirit,
Which none see by but those who bear it;
A light that falls down from on high,
For spiritual trades to cozen by;
An ignis fatuus that bewitches,
And leads men into pools and ditches,
To make them dip themselves, and sound
For Christendom in dirty pond;
To dive, like wild fowl, for salvation,
And fish to catch regeneration.
This light inspires and plays upon
The nose of saint like bagpipe drone,
And speaks through hollow empty soul,
As through a trunk, or whisp'ring hole,
Such language as no mortal ear
But spiritual eaves-droppers can hear:
So Phœbus, or some friendly Muse,
Into small poets song infuse,
Which they at second-hand rehearse
Thro' reed or bagpipe, verse for verse."

"Thus was th' accomplish'd squire endued
With gifts and knowledge, per'lous shrewd.
Never did trusty squire with knight,
Or knight with squire, e'er jump more right.
Their arms and equipage did fit,
As well as virtues, parts, and wit.
Their valours, too, were of a rate,
And out they sallied at the gate."

Their first adventure is encountering a rabble assembled at a bear-baiting, which is described with great minuteness and humour, and a sly hit is given at the sombre character of English amusements, which has been often since noticed by foreigners:—

"To this town people did repair
On days of market or of fair;
And to crack'd fiddle and hoarse tabor,
In merriment did drudge and labour:
But now a sport more formidable
Had rak'd together village rabble;
'Twas an old way of recreating,
By learned butchers called 'bear-baiting.'"

The knight's ire, increased no doubt by his remembrance of the 'Book of Sports,' is excited, and he resolves to put it down:—

"Thither the knight his course did steer,
To keep the peace 'twixt dog and bear;
As he believ'd he was bound to do
In conscience and commission too.
And therefore thus bespoke the squire:
'We that are wisely inspired higher
Than constables in curule wit,
When on tribunal bench we sit,
Like speculators should foresee
From Pharos of authority,
Portended mischief farther than
Low proletarian eyesight can;
And therefore being informed by spirit
That dog and bear are to dispute;
For as of late men's fighting sense,
Because they often prove the same;
(For where the first does lap to be,
The last does *principiate*),
Quantum in nobis, have thought good
To save th' expense of Christian blood,
And try if we by mediation
Of treaty and accommodation
Can end the quarrel, and compose
The bloody duel without blows.
Are not our liberties, our lives,
The laws, religion, and our wives,
Enough at once to lie at stake
For God's cause and the cause's sake?
But in that quarrel dogs and bears,
As well as we, must venture theirs?
This feud, by Jesuits invented,
By evil counsels is fomented;
There is a Machiavelian plot,
(Though every nose smell it not),
A deep design in't to divide
The well affected that confide,
By setting brother against brother,
To claw and worry one another.
Have we not enemies *plus satis*,
That *pares et æquus populus* hate us?
And shall we turn our fangs and claws
Upon our *own selves* without cause?
That some occult design doth lie
In blood Cynarctomachy,
Is plain enough to him that knows
How saints beat brothers by the nose.
I wish myself a pseudo-prophet,
But sure some mischief will come of it,
Unless by providential wit
Or force we avert and remedy it.
For what design, what interest
Can beast have to encounter beast?
They fight for no espoused cause,
Faith, privilege, fundamental laws;
Nor for a thorough reformation,
Nor covenant, nor protestation,
Nor liberty of consciences,
Nor Lords' nor Commons' ord'nances;
Nor for the church, nor for church lands,
To get them in their own no hands;
Nor evil counsellors to bring
To justice that seduce the king;
Nor for the worship of us men,
Though we have done as much for them."

He goes on to trace the mysterious and irreligious origin of "this lewd anti-Christian game:" but Ralph is an Independent as well as an Anabaptist.

"'To this,' quoth Ralpho, 'verily,
The point seems very plain to me:
It is an anti-Christian game,
Unlawful both in thing and name.
First, for the name: the word bear-baiting
Is carnal, and of man's creating;
For certainly there's no such word
In all the scripture on record:
Therefore unlawful, and a sin;
And so is, secondly, the thing.
A vile assembly 'tis, that can
No more be prov'd by scripture than
Provincial, Classic, National,
Mere human creature-cobwebs all.
Thirdly, it is idolatrous:
For when men run a-whoring thus,
With their inventions, whatsoe'er
The thing be, whether dog or bear,
It is idolatrous and Pagan,
No less than worshipping of Dagon.'
"Quoth Hudibras, 'I smell a rat:
Ralpho, thou dost prevaricate;
For though the thesis which thou lay'st
Be true, *ad unguem*, as thou say'st
(For that bear-baiting should appear,
Jure divino, lawfullest
Than Synods are, thou dost deny,
Totidem verbis, so do I):
Yet there's a fallacy in this;
For if by sly *homœosis*,
Thou wouldst sophistically imply
Both are unlawful, I deny.'
"'And I,' quoth Ralpho, 'do not doubt
But bear-baiting may be made out,

In gospel times, as lawful as is
Provincial or parochial classis;
And that both are so near of kin,
And like in all, as well as sin,
That put 'em in a bag and shake 'em,
Yourself o' th' sudden would mistake 'em,
And not know which is which, unless
You measure by their wickedness:
For 'tis not hard t' imagine whether
O' th' two are worst, though I name neither."

This opinion is controverted by the knight, but they agree at length to interfere to prevent the sport, the canto concludes, and

"Th' adventure of the Bear and Fiddle
Is snug, but breaks off in the middle."

We have, however, given rather a long specimen of the knight's eloquence, in order to introduce the character of a pedant, which is here so admirably exemplified, published among Butler's 'Genuine Remains in Verse and Prose,' edited by Mr. R. Thyer, in two volumes, which, though less known, and comparatively scarce, contain such an abundance of wit and keen observation, as to deserve a more extended publicity than they have obtained.

"A Pedant is a dwarf scholar, that never outgrows the mode and fashion of the school where he should have been taught. He wears his little learning unmade up, puts it on, before it was half finished; without pressing or smoothing. He studies and uses words with the greatest respect possible, merely for their own sakes, like an honest man, without any regard of interest, as they are useful and serviceable to things, and among those he is kindest to strangers (like a civil gentleman) that are far from their own country and most unknown. He collects old sayings and ends of verses as antiquaries do old coins, and is as glad to produce them upon all occasions. He has sentences ready lying by him for all purposes, though to no one, and talks of authors as familiarly as his fellow-collegiates. He will challenge acquaintance with those he never saw before, and pretend to intimate knowledge of those he has only heard of. He is well stored with terms of art, but does not know how to use them; like a country fellow who carries his gloves in his hands, not his hands in his gloves. He handles arts and sciences like those that can play a little upon an instrument, but do not know whether it be in tune or not. He converses by the book, and does not talk, but quote. If he can but screw in something that an ancient writer said, he believes it to be much better than if he had something of himself to the purpose. His brain is not able to concoct what it takes in, and therefore brings things up as they were swallowed, that is, crude and undigested, in whole sentences; not assimilated sense, which he rather affects; for his want of judgment, like want of health, renders his appetite preposterous. He pumps for affected and far-fetched expressions, and they always prove as far from the purpose. He admires canting above sense. He is worse than one that is utterly ignorant, as a cock that sees a little fights worse than one that is stark blind. He speaks a different dialect from other men, and much affects forced expressions, forgetting that hard words, as well as evil ones, corrupt good manners. He can do nothing, like a conjurer, out of the circle of his art, nor in it without canting."

RESULTS OF PENNY POSTAGE.

In the parliamentary session of last year a Committee was appointed to inquire into the state of the Post-office, with a view of adopting such measures as might seem best for fully and fairly carrying into effect Mr. Rowland Hill's plans of Post-office improvement. The labours of the Committee were cut short by the termination of the session, and they found it impracticable to make a Report. Even the evidence of Mr. Rowland Hill was not fully obtained in consequence of the late period of the session at which the Committee was appointed. Mr. Rowland Hill has, however, just published a pamphlet entitled 'The State and Prospects of Penny Postage,' in which his views on this most important and interesting question are more fully developed. The following statements are given in an abridged form from the pamphlet in question:—

Mr. Hill first enumerated the improvements already effected, the chief of which are as follows:—1. The uniform and low rate of one penny has been adopted as the general rate of postage throughout the United Kingdom. 2. Day-mails have been established on most of the principal lines from London, none of which existed previously to Mr. Hill's recommendation thereof; the plan having, nevertheless, originated with a gentleman whose claim to public gratitude for successful exertions in the cause of Post-office reform is well known,—Mr. Wallace, M.P. for Greenock. 3. On foreign and colonial letters the inland rates, as recommended by Mr. Hill, have been greatly reduced; and in divers cases the sea-rates also lowered. 4. The use of money-orders has been very greatly extended by the adoption of Mr. Hill's recommendation to the Treasury for lowering the money-order fees.

With respect to the results of these improvements, Mr. Hill stated that, in considering them, "it will be necessary to take into account the extreme depression of trade which existed when the penny rate was established, and has continued to prevail ever since; the very imperfect manner in which the plan has been carried into effect; the want of due economy in the Post-office; the well-known dislike to the measure entertained by many of those persons to whom its execution has been entrusted, and the influence such dislike must necessarily have had on its success." He then showed that, even under these disadvantages, the number of chargeable letters delivered in the United Kingdom had increased from 76 millions in 1838 to 207 millions in 1842 (the third year of penny postage). Also that at the commencement of 1843 the chargeable letters were at the rate of 219 millions per annum, or nearly threefold the former amount. While the increase in the Post-office expenses, though including much which in his opinion is wholly unnecessary, is, when the accounts are cleared of certain extraneous charges, actually less for the three years subsequent to the reduction of the rate than for the three years previous thereto. The gross revenue of the Post-office in 1842 he showed to have been 1,578,000*l*., or two-thirds of that in 1837, which in the Post-office Committee was adopted as a standard; and the net revenue in 1842 to have been 600,000*l*.

The following are other portions of Mr. Hill's evidence respecting the results of penny postage:—"The illicit conveyance of letters is in effect suppressed, at least as regards inland conveyance, except when, owing to imperfection in the Post-office arrangements, the law is broken to save time. The almost total removal of an habitual disregard of a positive law, habitual among all classes of society, must be regarded as a benefit of high social importance. Causes tending to suppress correspondence have been removed. Commercial transactions relating even to very small amounts are managed through the post; small orders are constantly so transmitted, and small remittances sent and acknowledged. Printers send their proofs without hesitation; the commercial traveller has no difficulty in writing to his principal; and private individuals, companies, and associations distribute widely those circulars, always important and often essential to the accomplishment of their objects. The poor now begin to enjoy their share of the convenience. No longer debarred from the expected letter by the charge with which it is laden, or driven to redeem it by pledging or sacrificing their little goods, they are permitted to correspond at a cost so moderate, that it is borne with ease and cheerfulness, and thus they find access to affectionate intercourse with their distant

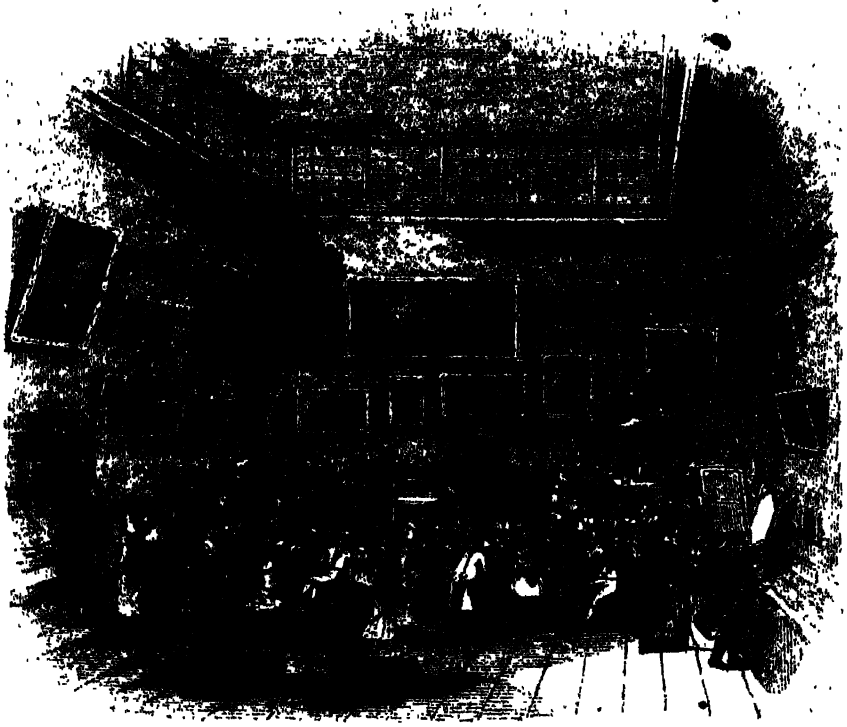
friends, and to that information often so important for the bettering of their condition, sometimes almost necessary for the preservation of health, and even of life. Remarkable cases have come to my knowledge of most important advantages being enjoyed by individuals among the poor, for which they were immediately indebted to the low rate of postage. In short, it is a fact as gratifying as it is well ascertained, that it is in districts inhabited by the poor that the increase of letters is the greatest."

As a specimen of the letters which Mr. Hill had received describing the commercial and social advantages of cheap postage, he read the following from Professor Henslow:—"To the importance of the penny postage to those who cultivate science I can bear most unequivocal testimony, as I am continually receiving and transmitting a variety of specimens, living and dead, by post. Among them you will laugh to hear that I have received three living carnivorous slugs, which arrived safe in a pill-box. This very day I have received from a stranger (by post) a parcel of young wheat-plants attacked by the larvæ of some fly; and these having arrived in a living state, I can at readily hand them over to an entomologist for his inspection and remarks. That the penny postage is an important addition to the comforts of the poor labourer, I can also testify. From my residence in a neighbourhood where scarcely any labourer can read, much less write, I am often employed by them as an amanuensis, and have frequently heard them express their satisfaction at the facility they enjoy of now corresponding with distant relatives. As the rising generation are learning to write, a most material addition to the circulation of letters may be expected from among this class of the population; indeed, I know that the pens of some of my village-school children are already put into requisition by their parents. A somewhat improved arrangement in the transmission of letters to out villages, and which might easily be accomplished, would greatly accelerate the development of country letter-writers. Of the vast domestic comfort which the penny postage has added to homes like my own, situate in retired villages, I need say nothing." Mr. Hill also referred to a letter from Mr. John Travers, the wholesale grocer, stating that since the reduction of postage his correspondence is quadrupled, that his credits are shortened, that his payments are quicker and more punctual, and his orders more numerous; and also to a letter from Messrs. Pickford and Company, the well-known carriers, by which it appears that while their postage for the year ending March, 1839, was on 30,000 letters, that for the year ending March, 1843, was on about 240,000; and that considering the number of enclosures now contained in one letter, they estimate the increase as really from 30,000 to 720,000. Mr. Hill mentioned also that "Mr. Stokes, the honorary secretary to the Parker Society (a society that contains among its members nearly all the dignitaries of the Church, and many other influential men, among whom is the present Chancellor of the Exchequer), states that the Society could not have come into existence but for the penny postage. It is for reprinting the works of the early English Reformers. There are seven thousand subscribers. It pays yearly from 300*l.* to 400*l.* postage. It also pays duty on three thousand reams of paper." Indeed, the important commercial and social advantages of penny postage were too obvious to need proof; they were fully admitted; and Mr. Hill's tender of the testimony of disinterested persons to the same effect was declined by the Committee as unnecessary.

Under the important head of Post-office revenue, Mr. Hill gave the following details to the Postage Office:—"I calculated on eventually obtaining the same gross revenue as in 1837, and that to effect this a fivefold increase of letters would suffice. Of course this calculation, which had no reference to immediate consequences, was founded upon the supposition, yet unrealized, that the plan was to be adopted in its integrity. It rested also upon the circumstances of the country remaining in their ordinary state, and neither did nor could anticipate the season of calamity which has ensued. In 1842, however, the gross revenue was fully two-thirds the former amount, and it is steadily increasing. Again, there is now no doubt that little more than a fourfold increase of letters will suffice. That such is the fact will be shown by the following statement:—The gross revenue of 1842 was 1,378,000*l.*, which must be increased by 46 per cent. in order to raise it to an equality with the gross revenue of 1837, which in the Committee was taken as a standard. The number of letters delivered in the United Kingdom, in 1842, was about 209 millions, which increased by 46 per cent. becomes 305 millions, or little more than four times the number of chargeable letters delivered in the United Kingdom before the reduction of the rate. In January, 1843 (the date of the last return), the number of letters delivered was at the rate of about 323 millions per annum, or almost exactly three times the former number. Finally, I calculated that in consequence of the simple and economical arrangements proposed, the fivefold increase in the number of letters would involve an addition of not more than 500,000*l.* per annum to the expenses of the Post-office, consequently that the net revenue would fall from about 1,900,000*l.* to about 1,300,000*l.*; and I gave a table (*Post-office Reform*, 3rd edit. p. 67) showing that the net revenue which might be anticipated from a threefold increase of letters was 580,000*l.* It appears that from a somewhat less than threefold increase in 1842, the net revenue was 600,000*l.*, even under the present costly management."

Mr. Hill next showed that the oft-repeated statement, that on the establishment of a penny rate a large sum of government postage was for the first time carried to the credit of the Post-office, was founded on a mistaken view of the case, arising chiefly from ignorance of the fact, that under the old system several of the Government offices paid the whole of their postage, while very few had entire exemption; all payments being then of course at the higher rates. Further, that the annual postage expenses of the three principal departments, viz. Customs, Excise, and Stamps and Taxes, were formerly as much as 60,000*l.*, whereas they were now only about 4000*l.* Next, as to security of correspondence, Mr. Hill showed that according to a reasonable estimate of the increase in the number of money-letters (an estimate much below that to be inferred from the Post-office estimate of London money-letters), there was good reason for believing that the security is at present quite as great as under the old system; and this, notwithstanding the abandonment of gratuitous registration and the non-adoption of several precautionary measures which he had recommended. He afterwards laid before the Committee a general statement of measures of improvement not yet effected, but which he had recommended while at the Treasury, several of them essential parts of his original plan, preceding the enumeration by reading portions of his official correspondence with the Chancellor of the Exchequer, strongly and repeatedly pressing these measures on his attention.

Mr. Hill's unexpected removal from the superintendence of his own plan has left the management of it in the hands of parties who are in some respects averse to it. His views respecting the present working of the plan are given in the pamphlet.



[Auction-Room at Christie's.—From a Print by Gilray.]

AUCTIONS IN LONDON.

If we take up the morning's newspaper, and glance over the lists of sales by auction therein contained, in order to form some rude estimate of their number, and the amount of property concerned in them—if we then extend our calculations to a month, instead of a day—and then again to an entire year, we shall arrive at a somewhat startling view of the magnitude of this branch of the affairs of the Metropolis, and look back with astonishment at the state of things in the City two centuries ago, as evidenced in the charter granted to the mayor and citizens by Charles I. We there find created the new office of Outroper, or common crier for the sale of all household stuff, apparel, leases of houses, goods, chattels, and so on, belonging to persons who shall be willing to sell the same by public and open claim, commonly called outcry, and which officer *alone*, within the boundaries of the City, the Liberties, and Southwark, was so privileged. It is difficult now to imagine a London with one auctioneer, yet such it seems there was in the seventeenth century. Even the name 'auction' we thus learn is of comparatively modern date among us; and which, as well as the thing, comes originally from the Romans, who, during their warlike prosperities, established the custom of selling military spoils, with no more ceremony than that of merely sticking a spear in the ground, under which the sales immediately took place; and as each bidder *increased* his bidding on the one before him, the descriptive appellation of *auctio*, an increase, was given to them.

The peculiar mode of selling formerly in use in this country offers a scarcely less forcible illustration of what auctions were, as contrasted with what they are; we allude to the "sale by the candle," an expression rived from the old custom of employing candles during an auction to measure time, "it being declared that no one lot of goods should continue to be offered to the biddings of the company for a longer time than would suffice for the burning of one inch of candle; as soon as this rude kind of measure had existed to that extent, the then highest bidder was declared to be the purchaser."* If we now step into Christie's or some other eminent auctioneer's rooms, on ordinary sale-days, and mark the rapidity and importance of the business transacted, we cannot but smile at the remembrance of the inch of candle, and feel something of a sense of the ludicrous as we think of the period of time that was not to be exceeded in the sale of a *lot*, and of that which is actually occupied in selling it in a modern auction-room.

The truth seems to be, that before the present century auctions were rather an incident of trade than an essential feature; and that they were confined in a great measure to the sale of books, pictures, and what formed an important item in the expenditure of a fashionable of the last century—articles of virtù, with antiquities and curiosities of all kinds, among which old china enjoyed especial attention. The allusions of our comic dramatists to the auctions and auction-hunters of the day, buying anything and everything, whether wanted or no, since "it was so cheap," will be in most readers' recollection. But when the habit of selling by auction began to prevail among our merchants and other men of business, its progress was very rapid, and, in consequence, a host of unanticipated evils sprung up to keep it company, and to give our legislators employment. In 1818, a Select Committee of the House of Commons was appointed to inquire into the subject, and after examining various witnesses, they came to the conclusion that great frauds were constantly being committed, through the modes of sale then prevalent. Some persons, it appears, made a business of getting up articles of inferior manufacture, to be thus disposed of, under fictitious representations as to ownership, and

[* 'Penny Cyclopædia,' art. 'Auction.']

by attaching to their worthless productions the names of the most respectable makers, who not unfrequently found it necessary to resort to the auction-rooms in order to expose personally the fraud attempted upon them and the public. A curious evil complained of by the committee was that of daring combinations by a set of men who attended real sales, and by various means drove respectable purchasers away, then bought in what was offered at their own prices, and afterwards privately sold the same, under a form of public auction, called knock-out sales. The gentry here described are not altogether extinct as yet, as a stranger, who attends some of the less respectable of the London auction-rooms, is painfully reminded, by the annoyance to which the lower class of brokers and Jews subject him. Nay, in some of the most public thoroughfares we have even living examples of some of the other practices referred to by the committee. There still exist mock auctions, with their mock bidders and mock valuables ready to impose upon the first stranger who shall be ignorant or credulous enough to step in with his real money. From such nests of swindlers, whom our ordinary laws appear to be inadequate to put down, and for whom, therefore, it is much to be wished there were extraordinary—from this to the rooms shown in our engraving the transition is indeed great, the contrast remarkable. It is not simply the almost European reputation which the house in question has long enjoyed, for a business house, conducted upon honourable and enlightened principles, that entitles the name of Christie to respectful mention; but that name has individual literary associations connected with it of a noticeable character. The eldest son of him who raised the firm to its lofty position, and who subsequently was himself its principal, was the late James Christie, Esq., no less distinguished as the scholar and the gentleman than as the auctioneer. His first literary production was a disquisition upon Etruscan vases, a subject suggested to him through his intimacy with the collection of the famous Townley Marbles. Works of a similar character followed at different times; and, without entering into particulars, it will be sufficient to transcribe the opinion of the author of a memoir in the 'Gentleman's Magazine,' that "the originality of his discoveries is not less conspicuous than the taste and talent with which he explains them." To which we may add, from the same eloquent tribute to his memory, that it will not seem surprising to find that such a man "raised the business he followed to the dignity of a profession. In pictures, in sculpture, in virtù, his taste was undisputed, and his judgment deferred to, as founded on the purest models and the most accredited standard. If to these advantages we add that fine moral feeling and that inherent love of truth which formed the basis of his character, and which would never permit him for any advantage to himself or others to violate their obligations, we may then have some means of judging how in his hands business became an honourable calling, and how that which to many is only secular, by him was dignified into a virtuous application of time and talents." This, the best of auctioneers, if we may credit the portrait here drawn of him, died in 1831. The subject of auctions is, however, too interesting to be completed within our present limits, and it will therefore be resumed in a future number.

THE SALT-TRADE OF FOREIGN COUNTRIES.

It is remarkable that in many countries the sale of salt still continues a government monopoly. The commodity may at first thought seem too trifling to be regarded with such a degree of importance; since we know that in England, at present, one pennyworth will supply the domestic wants of a family for a considerable period. But when we come to regard it in connection with the feeding of cattle, the curing of fish, and other extensive modes of consumption, and at the same time remember how absolutely indispensable it is at almost all our meals, especially those of the poorer classes, we cannot fail to see its importance, and to appreciate the effects of any restriction in the free purchase and sale of it. We will notice briefly the position of the salt-trade in Hungary, in Tuscany, and in British India, as examples of the modes in which this commodity is made the subject of government monopoly.

In Hungary a monopoly of the sale of salt is one of the royal privileges, acknowledged as such by the nation, and enjoyed by the crown for a long succession of years. In the year 1800 the price was fixed by the government at half a florin (one shilling) per centner; but the long and exhausting wars with France led the government to raise the price to three florins and a half in Transylvania, and seven and a half in Hungary. The salt is a very hard rock-salt, dug with pickaxes from the royal mines, and brought to market in cubical masses weighing about fifty-eight pounds each. The miner receives two kreutzers and a half (twopence) for working out one of these masses. Mr. Turnbull, in his work on Austria, states that government salt-venders are established in almost every town and village. Any vein of rock-salt being found on an estate, becomes at once the property of the crown, and can only be worked by its agents. In the maritime provinces of Ischia and Dalmatia there are works belonging to individuals for producing salt from sea-water; but these are under the strict surveillance of the government officers. Only a certain number of Salines, or works, may be established, in pursuance of licences annually granted; only a certain quantity of salt may be made, and this must be sold to the government itself, at a regulated price. In places very distant from the sources of supply, certain quantities of foreign salt are permitted to be imported from abroad; but the agents of the government must alone be the importers and the venders: so that the whole sale and management of the article, in every shape, is in the hands of the officers of the crown. The selling price is regulated somewhat as follows:—a fixed sum is calculated as the expense of production; another fixed sum is taken in regard of profit; and to these two items is added the actual expense of carriage, which, on so bulky an article, and with roads so bad as those of Hungary, is very heavy; so that the price varies greatly according to the distance from the mines. At the mines it can be sold for tenpence the centner of one hundred and twenty-three pounds, whereas in distant parts it costs the consumer fourteen or fifteen shillings.

This system leads to the smuggling of salt into Hungary from Wallachia. Mr. Paget says:—"I have been shown the salt-smugglers' paths on the frontiers of Wallachia, where they often come over with whole troops of laden horses. I have heard from the country magistrates that it was ridiculous to attempt to oppose them; that they had the sympathy of the peasantry with them, and were not only able to bribe the border-guard, but that they came in such numbers, and so well armed, that they did not dare even to make a show of resisting them. I doubt if there is one great proprietor in the south of Hungary who uses government salt, except in such quantity as decency requires to blind officers who do not wish to see. In that part of Hungary bordering on Transylvania the more tender-conscienced declared they would not use Turkish salt on any account; but I found that that was

because it was cheaper to smuggle it from Transylvania, where it is only half the price it is in Hungary."

In many other countries of Europe salt is similarly monopolized by the government, for the sake of profit. Even in Tuscany, which is among the most liberally governed of the Italian states, this system is followed with great strictness. Dr. Bowring, in one of his Commercial Reports, states that the salt is procured from brine-springs, principally near Volterra; and he describes the mode of manufacture. Captain Basil Hall, in one of his sketches, quotes a statement made to him by an inhabitant of Tuscany, illustrative of the absurd extent to which the system is carried:—"Not only are the ordinary steps taken to prevent the intrusion of competitors in the open market, but such is the dread of a rival manufacture, it is actually against law to draw a bucket of water; so that when my children were once directed to be washed in salt water, I was obliged to apply for a regular commission from the Custom-house before my servant would venture to bring a couple of gallons from the shore. One summer's day, when my sons were bathing on a shallow part of the coast, they were surprised to observe a thin, but extensive, coating of salt on the surface of the sand, caused, no doubt, by the sun's rays having evaporated the water. The boys wondered that so valuable an article, as they had been taught to consider salt, should be left on the beach to melt in the rain, or to be washed back again into the surf. Thinking no evil, of course, they collected a towel-full and brought it to me, who was as much surprised as the lads. But while we were standing around this newly-discovered treasure, and speculating on the strange fact of its being allowed to run to waste, one of the Italian servants, who happened to be passing, saw the contents of the towel. Turning as white as the salt itself, he exclaimed, 'In the name of the Virgin, how could you be so imprudent as to pick up salt from the seashore?—Don't you know that you are subject to a heavy fine for infringing the laws of the country? Even now,' continued the greatly alarmed domestic, 'it is my duty to give information to government; otherwise, if it becomes known, I shall be punished.' The salt was, by general consent, buried in a hole in the garden, as a means of avoiding troublesome consequences."

In the British provinces of India, in or contiguous to Bengal, the manufacture and sale of salt have for many years been wholly in the hands of the East India Company, who have derived a large revenue from it. During the discussions which arose preparatory to the renewal of the Company's charter, and among the voluminous documents relating thereto, the nature of this trade became fully inquired into. We believe that in the main the trade still remains in the hands of the Company; but as changes of detail have probably taken place, we will speak of the trade as it was a few years ago.

It was only by gradual steps that the Company acquired this monopoly. In the infancy of their power, the agents of the Company acquired from the Mogul emperors an exemption from all duties "on whatever goods and merchandise their agents might bring or carry, by land or by water, in the ports, quarters, and borders of the provinces." By degrees the agents of the Company got their exemption to extend to every kind of goods bought and sold by them; and thus the Company were able to sell at a higher profit than other parties. "Dustucks," or "permits," were granted to the privileged parties, and a system of great extortion sprang up under the influence of these privileges. By the year 1765 the trade in salt by the government agents, under this system, became so oppressive to the natives, that the Company found it necessary to change the mode of proceeding. Lord Clive formed a plan whereby the trade would be advantageous to the Company, and at the same time free from many of the abuses to which it had before been exposed:—all private dealers were recalled from the interior; a society was formed for the exclusive purchase and sale of salt at certain specified markets; the shares in this society were distributed among the Company's servants; a committee was appointed to manage the affairs of the society, and the society was bound to pay the Company a duty of 35 per cent. on the selling price of the salt. Very soon afterwards this plan was again altered, and it was ordered that salt should be sold by the society only at Calcutta, and at a price not exceeding a certain limit: the salt was sold to native merchants at Calcutta, who were limited as to the quantity purchasable; and they sold it to others at an advanced price (also strictly limited), by whom it was retailed throughout the country; the government duty being at the same time raised to 50 per cent.

The East India Directors in London disapproved, however, of this society altogether, and ordered it to be abolished; compensating the shareholders at the same time for their loss. The trade was then thrown open to private merchants, under restrictions to prevent monopoly and oppression. In 1772 a new plan came into operation, whereby the salt was to be manufactured from the brine-springs by the Company; and that the Collaries, Golahs, or Coolahs (for the word is spelt in all these ways by different writers), or manufactories, should be farmed out for five years, the farmers delivering the salt at a stipulated price, and the Company selling to the dealers at an advanced but also stipulated price. Five years afterwards this plan was so far altered, that the person who farmed the salt manufactory was allowed to sell the salt to whom he pleased. In 1780 another modification took place, in which the salt was manufactured for the Company by agents, who had a per centage on the proceeds; and the salt was sold at a price to be regulated by the government at the commencement of every season. In 1787 the salt was ordered to be sold by public auction, instead of at a fixed price; the salt districts were divided into five agencies, each of which was superintended by a paid European agent. This system, with certain minor changes, continued in operation till the renewal of the Company's charter a few years ago.

The district under the operation of these rules was chiefly in or near the delta of the Ganges, called the Sunderbunds, south and east of Calcutta. The salt was manufactured by a very poor class of natives called *Molungees*, who received a stipulated price for a given weight of salt manufactured; and as they were always in extreme poverty, the payment was made in advance. The agreement was thus made:—On a certain day the labourers and the officers assembled in a particular place. Each labourer had a "hath chittee," or book in which his running account was kept; and the money advanced was given to him, examined by him, and entered in the "hath chittee." They then departed to the *Golahs*, where they manufactured the prescribed quantity of salt; and at the end of the season the Company's agent assembled them all together, examined their accounts, and the quantity of salt produced by them; and if the whole of the money had not been advanced to them, they now received the remainder. It was supposed that in 1831 upwards of [illegible] hundred thousand Molungees were employed in this manner, principally in a very unhealthy part of Bengal.

The Company, having thus obtained their supply of salt, put it up periodically for public sale in lots at Calcutta, at intervals of about a month; each lot varying from five hundred to one thousand maunds (the

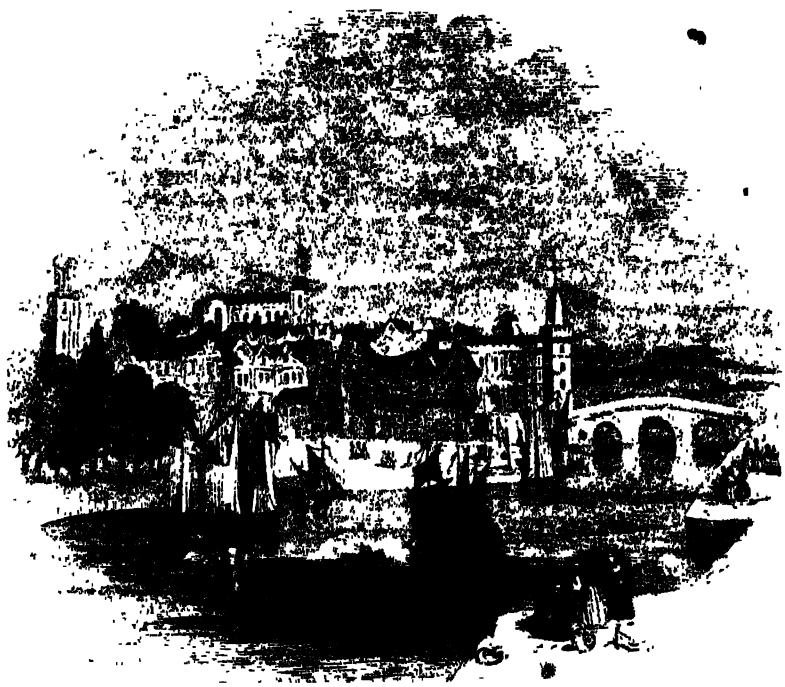
maund being equal to about eighty-two pounds). The price varied from about three hundred and fifty to four hundred and fifty rupees per hundred maunds, averaging about 12*s.* 9*d.* per cwt. Nearly all the purchasers were wealthy Hindoos residing at Calcutta; and they were allowed to remove the salt from the Company's warehouses at their convenience.

The price which the natives of India paid for the salt (which is there a commodity very earnestly sought after) was greatly enhanced by the number of hands through which it passed. The salt-dealers were of various kinds, each receiving a share of the profit which determined the ultimate price of the salt. The first or highest were called *Dhuratias*. They purchased, at the public sales in large quantities, and either sold out immediately at a profit, or kept their commodity until a favourable state of the market occurred; paying to the Company a rental so long as the salt remained in the Company's warehouses. The next were second-class *Dhuratias*, men of limited capital who traded somewhat on the principle of stock-jobbing in the Funds. They had not money to pay for their purchases at the sales, but paid only a deposit, and endeavoured to sell before the time arrived for paying the Company. They sometimes lost by the bargain, since they must sell in time to get money to pay for their purchase. The *Baugahs* were dealers possessed of sufficient capital to pay for their purchases at once, and send the salt into the interior, where they sold it retail in their own warehouses. The second and third class *Baugahs* were merchants who differed from the former in allowing a system of credit, enhancing the price accordingly. A lower grade of dealers were the *Assamees*, who bought salt of the Baugah merchants, and sold it in smaller quantities to the *Moodies* and to large families. The *Moodies* were the lowest class of dealers, who supplied the smallest quantities to the poorest persons.

This chain of dealers necessarily drove up the price to a high point, and the Company was often urged to change the plan of proceeding; but the Company's monopoly (no persons being allowed to make salt but the Company's agents) was only in part the cause of this, since the buyers of small quantities of goods, especially in the interior of a country, usually have to pay largely for the number of hands through which the commodities pass. As to the monopoly itself, the Committee of the House of Commons on India affairs, in 1832, stated the revenue from salt (1,500,000*l.* per annum) to be too large to be given up, but recommended an attempt to be made to import salt into India from other countries, the sale still remaining in the hands of the Company.

Gradations of Animal Life.—Change of some kind is the law of the universe: everything which God does is progressive: and the present question is, whether any of his progressions, having reference to human beings, appear to run on into infinitude? Now, in seeking for an answer to this question, we are encountered by an apparent law of the organised, or, at all events, of the sentient creation, of a truly remarkable character; a law which, though discernible only in fragments, and interrupted by seeming exceptions, holds with sufficient consistency to disclose the general method of nature—viz. that in proportion to the excellence and dignity of any form of existence, is it long in coming to maturity; that the cycles of things are great in proportion to their worth. It is needless to say, that there is no other criterion of the worth of a being than the magnitude of its capacities and the number of its functions. In glancing our eye up the chain of animal races, however difficult it may be to arrange them symmetrically in an ascending series, the outlines of this law are surely sufficiently obvious. The creatures which, by universal consent, would be placed at the lower end of the scale, seem to come into life perfect at once, or, if they grow, to grow only in quantity: as if, of an existence so inferior, no part could be spared as preface to the rest. The perfect formation of creatures of a superior order divides itself into several distinguishable stages; and the greater the number of faculties and instincts, the longer is the period set apart for the process of development. The lion has a longer infancy than the sheep, and the sagacious elephant than either. The human being, lord of this lower world, is conducted to this supremacy through a yet more protracted ascent; none of the creatures that he rules have an infancy so helpless or so lasting; none furnish themselves so slowly with the knowledge needful for self-subsistence; as if to him time were no object, and no elaboration of growth were too great for his futurity.—*Rev. J. Martineau.*

A Race of Pigmies.—Beyond the extensive wilderness which bounds Caffa on the south are the Doko, a pigmy and perfectly wild race, *not* exceeding four feet in height, of a dark olive complexion, and in habits even more closely approximated to "the beasts that perish" than the bushmen of Southern Africa. They have neither idols nor temples nor sacred trees; but possess a glimmering idea of a Supreme Being, to whom in misfortune—such as any of their relatives being slain by the kidnapper—they pray standing on their heads, with their feet resting against a tree: "*Yere*, if indeed thou art, why dost thou suffer us to be killed? We are only eating ants, and ask neither food nor raiment. Thou hast raised us up. Why dost thou cast us down?" Many natives of Caffa and Enarea, who have visited these pigmies in their native wilds, for evil, describe the road from the former kingdom to pass through forests and mountains for the most parts uninhabited, and swarming with wild beasts, elephants and buffaloes especially. From Bonga, distant about 50 or 60 miles, it is ten days' journey to Tuffice, the Omo river being crossed midway by a rude wooden bridge, 60 yards in breadth. Seven easy stages beyond Tuffice is Kooloo, whence the Doko country may be reached in one day. The climate is warm and the seasons extremely wet, the rains commencing in May, and continuing without the slightest intermission until February. The country inhabited by the Doko is clothed with a dense forest of bamboo, in the depths of which the people construct their rude wigwams of bent canes and grass. They have no king, no laws, no arts, no arms, possess neither flocks nor herds; are not hunters, do not cultivate the soil, but subsist entirely upon fruits, roots, mice, serpents, reptiles, ants, and honey—both of which last they lick like the bear from off their arms and hands. They beguile serpents by whistling, and, having torn them piecemeal with their long nails devour them raw; but although the forests abound with elephants, buffaloes, lions, and leopards, they have no means of entrapping them. A large tree called Loko is found, amongst many other species, attaining an extraordinary height, the roots of which, when scraped, are red, and serve for food. The *yebo* and *meytee* are the principal fruits; and to obtain these, women as well as men ascend the trees like monkeys, and in their quarrels and scrambles not unfrequently throw each other down from the branches. Both sexes go perfectly naked, and have thick pouting lips, diminutive eyes, and flat noses. The hair is not woolly, and in the females reaches to the shoulders. The men have no beard. The nails, never pared, grow, both on the hands and feet, like eagle's talons, and are employed in digging for ants. The people are ignorant of the use of fire. They perforate the ears in infancy with a pointed bamboo, so as to leave nothing save the external cartilage, but they neither tattoo nor pierce the nose; and the only ornament worn is a necklace composed of the spinal process of a serpent. Prolific, and breeding like wild beasts, the redundant population forms the wealth of the dealer in human flesh. Great annual slave-hunts are undertaken from Dumbaro, Caffa, and Kooloo; and the dense forests of bamboo, the creaking of which is represented to be loud and incessant, often prove the scene of fierce and bloody struggles between rival tribes. Wide tracts having been encircled, the hand of rovers, converging, impel the denizens to the centre. Holding a gay cloth before their persons, they dance and sing in a peculiar manner; and these defenceless pigmies, aware from sad experience that all who attempt to escape will be ruthlessly hunted down, and perhaps slain, tamely approach, and suffer themselves to be blindfolded. One hundred merchants can thus kidnap a thousand Dokos; and although long prone to their old habits of digging for ants, and searching for mice, serpents, or lizards, the captives rarely attempt to escape. Their docility and usefulness, added to very limited wants, rendering them in high demand, none are ever sold out of the countries bordering on the Gochob, and none, therefore, find their way to Shoa.—*Major Harris's Highlands of Æthiopia.*



Bilbao.

PROVINCE OF BISCAY.

The lordship or province of Biscay, Bizcáya, or Vizcáya, one of the Basque provinces in Spain, is bounded on the north by the Bay of Biscay, and its inland limits are the provinces of Alva; Old Castile, Guipuzcoa, and New Castile. The territory is occupied by mountains, with numerous narrow valleys and well-cultivated plains between them, which give the country a singularly pleasing aspect, both for the agriculturist and for the lover of the picturesque. Some of the mountains appear like several hills heaped upon one another, such as that of Gorveya, which is reckoned to require five hours' walking to reach the top. On its summit is a large plain, which furnishes abundant pasture to cattle during the summer months. Near Durango there are other mountains, or rather large masses of calcareous rocks, naked, and of very difficult ascent. Near the bar at Portugalete is the lofty Serrantes, an immense natural pyramid, which points out to sailors entrance of the port, and which Bowles considers to l extinct volcano. There are other mountains, which terminate in bare points of calcareous rocks, yet have a very easy slope, are well cultivated, and covered with neat farms. There are some round low hills, which are inhabited, and well cultivated to the summit.

The soil rests in general upon rock of different kinds, some of which rises above it in immense masses of sandstone, calcareous rocks, or pure marble. The marble is nearly black, with white spots and veins. Several torrents descend from the mountains, which in the rainy season have a full stream, but in summer are almost dry. The coast is very abrupt and deeply cut in different points, through which the sea penetrates to a considerable distance inland, forming *rias* and ports for fishing-boats and small trading-vessels. The principal of these ports are, from east to west, Lea, Bermeo, Plencia, and Portugalete. The rivers which run into the Bay of Biscay on the shore of Spain have a short course, originating commonly twenty or thirty miles, and perhaps never more than forty miles, from the coast, so that here the basin of this gulf extends only a short distance inland. The commerce carried on by means of these rivers is therefore inconsiderable, and the harbours in this part of Spain are comparatively but little resorted to, owing to the height of the mountains which divide them from the plains in the interior of the peninsula, and the difficulty and expensiveness of the transport of heavy commodities. From the inland provinces only wool is brought to the ports of Santander and Bilbao; the produce of the coast itself is not considerable, and consists chiefly of fruits. With the exception of the arable land and the bare summits of the highest mountains, the province is covered with natural or artificial woods of wild holly, arbutus, and oak. Where the soil is not deep enough for raising large trees, it is covered with argumas, or furze, and several species of erica, or heath. The lower parts of the mountains are planted with oak and chestnut. Apple-trees grow in every part of the province, almost without cultivation. Cherry-trees grow to the size of a large elm, and the peaches are among the best in the Peninsula. There are several species of pears, two of currants, and several varieties of figs and walnuts. Strawberries are indigenous in Biscay; those that grow wild in the woods are not very large, but when cultivated in the neighbourhood of Bilbao they are of the best in Europe. The kitchen vegetables are excellent and plentiful, particularly onions, which are very large and sweet. In the territory of Bilbao, Orduña, and the Encartaciones, very good muscat and white table grapes are cultivated; and likewise the common grape, of which the Biscayans make their chacoli, or wine. Some of the vines are high, and planted by the side of the road or near the farms; but the greatest part of them are low vines, rising between three and four feet above the ground. The chacoli is one of the products which gives most profit; but as the municipal authority fixes the price

for sale, and absolutely prohibits the introduction of any other wine while it lasts, the farmer only attends to the quantity, and not to the quality of the liquor he makes. Bowles says, that if the grape were allowed to ripen, and the wine to ferment completely, chacoli would be a sparkling wine little inferior to champagne.

The soil of Biscay is in general clayey, and although from time immemorial the farmers have mixed it with calcareous earth to render it lighter and more fertile, it is only by great labour that it is rendered productive. In October the earth in the plain is dug up in large clods and left till the spring in that state, when it is broken to pieces and planted with Indian corn, pumpkins, and scarlet-runners. This crop is gathered in October, when wheat is sown; after cutting which, in the following August, the soil is left bare, and produces only grass for the cattle. The labour on the low hills is different. in July and August, the turf is dug up and formed into heaps, which, being hollowed, are filled with dry brushwood and burnt. The ashes and burnt earth are then strewed about. The three first years the soil produces abundant crops of wheat, in the fourth year they sow it with rye, and in the fifth with flax; afterwards, it is left for pasture-ground.

All the province abounds with game. The partridges and quails are exquisite. There are also wild doves, snipes, and woodcocks. The chimbo, a very delicate bird of passage, arrives at Biscay in August, and remains there till the end of October. Hares are not very abundant; but deer and wild rabbits are plentiful. Wolves are very rare, and it is still a greater rarity to find a bear, but foxes are plentiful everywhere. The oxen of Biscay are small, but strong, and give a very juicy and well-flavoured meat. There are also goats and a few sheep. The sea and rivers abound in delicate fish, not inferior in flavour to that of Asturias and Galicia.

Biscay is very rich in minerals: the most common is iron, which is found in almost every part of the province. The most productive of these mines are those called Veneras, about five miles from Bilbao. The richest mine, and that which contains the most malleable metal, is that of Somorostro. Everybody is allowed to dig out the ore, to take any quantity he pleases, and to transport it where he pleases, without paying any duty. A hundred pounds of ore produce from thirty to thirty-five pounds of iron.

The population of Biscay is reckoned at one hundred and thirty-three thousand, distributed in one city, twenty towns, seventy anteiglesias, and ten valleys or republics. The only city in the province is Orduña, and the principal villa or town is Bilbao, the capital of the province; but the whole province appears one large town composed of isolated farms, a certain number of which forms a parish with a church in the centre. The houses are in general two stories high; the ground floor is used for the cattle, cellaring, and the implements of agriculture; the first-floor is occupied by the family; and in the second the grain and fruits are preserved. Every house has an oven, a kitchen-garden, an orchard, and a certain portion of arable land and woodland. In former times, the houses were built of stone to the first floor, and the second of wood; but at present they are all of stone, floored with wood. It is the greatest rarity to see a ruined house, while new ones are often built. The greatest part of the farms are cultivated by their owners, who are called *echejaunac*, that is, lords of the house, in possession of whose family they have been from time immemorial, as every family considers it a disgrace to sell the patrimonial house. In general, the name of the family expresses the situation or some other circumstance of the house; hence the names Echaluze, Goicochea, Goyeneche, &c. In this, as in all the northern provinces of Spain, are found those old edifices called Solares, from the founders of which the ancient nobility descend. These buildings are of very simple construction, flanked by strong towers: at present very few of them exist. The greatest part of them have been destroyed in times of civil discord, and others have been altered to suit the convenience and comfort of the owner, rather than please his vanity. The owners of these houses are called Parientes Mayores, and are by all their relations considered as the heads of their respective families. Some of these families were the founders of the churches, have received the tithes, and appointed the ministers to serve in them, from a time which was said to be immemorial five centuries ago. Beyond this privilege, and the influence which their riches may give them, they possess no other, nor are they considered as superiors by any other independent although poorer farmer. The early education which the people give to their children at home is more calculated to harden their bodies than to develop their mental faculties; but at a later period they send them to colleges, where they receive the necessary instruction. The daughters, even of the richest persons, are employed in all the menial labours of the household, and pride themselves on their skill in these matters. Bowles says, that when he visited that country he imagined himself transferred to the patriarchal age; and adds, "Whoever seeks native simplicity, health, and real happiness, will undoubtedly find these blessings in these mountains, it is in them that he will find in general a people, if not opulent, really contented, true patriots, and not servilely submitting to the powerful. Every one possesses something: and, in general, it is considered disgraceful to be a beggar." Although things have greatly altered since Bowles's time (1780), it is not rare to find families who still preserve the simplicity of manners here described.

The climate of Biscay is in general damp and cold, but so salubrious, says Bowles, that if it were not for the diseases which the people contract from excessive eating during their festivals, physicians would be almost useless. Although they drink in proportion, it is a very rare thing to see a Biscayan drunk.

Bilbao is the capital of the lordship of Biscaya. It is situated in a spacious and fertile plain, on the east or right bank of the river Nerva or Nervion, called by the inhabitants Ibaizabal, nine miles east-south-east of Portugalete. The plain of Bilbao is surrounded by high mountains, from which numerous torrents descend in the rainy season. This circumstance formerly exposed the town to frequent inundations: but the inconvenience has been of late avoided by widening the canal, and constructing dams and other works. The plain is very well cultivated, and covered with numerous neat country-houses.

Bilbao contains four parishes, five convents of nuns, two of monks, an hospital, and about eight hundred houses, substantially built, generally three stories high. The hospital is a magnificent stone building, containing six hundred beds, a chapel, and an apothecary's hall, with a competent number of officers in every department. The sick are visited twice a-day by the four physicians, and two surgeons of the town. A committee of respectable citizens superintend the whole. The hospital has been built and is supported by voluntary contributions, and every poor invalid of Bilbao has admittance into it cost-free.

There is also a Casa de Misericordia, or charity-house, supported by voluntary contributions, and superintended by a committee of respectable individuals, to provide with food, clothing, shelter, and instruction foundlings and orphans, or otherwise destitute children. There is a manufactory of common earthen-

ware connected with the establishment in which the children work. They are besides instructed, at the expense of the house, in some business which may be the means of procuring them an honest livelihood. The streets are all well paved with square flat stones on both sides, and with small round stones in the middle. No carriage of any sort is allowed in them, by which means the pavement is much longer kept in repair. The water of the river is conducted through pipes to the most elevated part of the different streets, from which it flows through them in abundance, washing away all the dirt, which it carries to the river. The market-place, situated at the eastern extremity of the town, is always abundantly supplied. The slaughter-house, where the meat is also sold, is a fine building of the Tuscan order, situated in the middle of the town. Possessing an abundant supply of water from a fountain constantly flowing, and being open on all sides so as to permit a free current of air, there is nothing in it to offend either the sight or the smell. On the right bank of the river there is a wide and pleasant promenade planted with lime-trees and oak, and lined with many houses, gardens, and warehouses. Numerous wharfs and strong moles are built on both banks at different places down the river to Portugalete. There are three bridges over the river at Bilbao: one, very old, of stone; another of wood, of modern construction, very solid and handsome, with one arch; and the third is a suspension bridge of recent construction. The tide ascends as high as the town, but only small vessels under sixty or seventy tons can sail so far up the river, except with a very full tide; the greatest part of them remain at Olaveaga, two miles from the town.

Bilbao is the seat of the government of the province, and of the consulado, or tribunal of commerce. That body has endowed schools for the gratuitous instruction of the youth of the town in architecture, mathematics, navigation, drawing, and the French and English languages. There is a school where poor children are instructed gratuitously in reading and writing, and another for teaching the Latin language, both supported by the ayuntamiento, or common council.

The people of Bilbao are kind and hospitable: their society is pleasing and easily accessible to strangers. The women of the lower class, who are employed as carriers and in other manly occupations, are so robust that they may be frequently seen after a day of laborious employment dancing as cheerfully as on a holiday. They are clean and neatly dressed, and in general go barefooted. To gratify the inclination of the common people for dancing, the town pays three men, who play on the tambourine and the provincial wind-instruments at the public dances. There is a public building for playing at ball and two for tennis, of both which exercises the people are exceedingly fond. There are five very pleasant fountains, a capacious and handsome playhouse, several coffee-houses, and many shops and warehouses, abundantly supplied with all articles of foreign merchandise, which, owing to the moderate duties and the intelligence of the people in mercantile concerns, may be obtained as cheap as in the countries where they are manufactured. The population of Bilbao is 15,000. The inhabitants are employed in agriculture, commerce, and the manufacturing of iron. There are also manufactures of paper, hats, soap, leather, earthenware, and cigars. The principal articles of exportation are wool and wheat to foreign countries, and iron to other parts of the Peninsula.

Bilbao was twice besieged, in 1837, by the Carlists, and has since been fortified.

FRANKINCENSE AND MYRRH.

The manner in which *Frankincense* and *Myrrh* are mentioned in the Bible, associated with gold and precious stones as costly productions, plainly indicates the importance with which they were regarded. From the book of Genesis onward throughout the greater part of the Bible there are these allusions; principally in connection with the duties of the priestly office.

Myrrh is more frequently alluded to as a delightful scent than as employed in religious observances.

Frankincense is an odoriferous aromatic gum or resin, formerly burnt as an incense in temples, and now used in pharmacy. It distils from incisions made in an Asiatic tree during the heats of summer. Both the place whence it is procured and the tree which produces it have long been deemed uncertain. It has generally been considered that Arabia Felix is the country of its growth, but some have named the Holy Land, and others have stated it to have been found in the East Indies. When, however, we consider that a warm climate extends throughout the southern parts of Asia, we may naturally conclude that a tree which will grow in one place may also be cultivated in many others. Pliny was evidently at fault as to the kind of tree which produces it; and it is only in modern times that it has been ascertained to be what is now termed the *Boswellia Serrata*, growing in Arabia, but still more luxuriantly in the East Indies.

The perfume is divided into two kinds, the one called *olibanum*, and the other *frankincense*. Olibanum is in white bits or tears of a yellowish colour, with a bitter disagreeable taste, and when chewed it promotes the flow of saliva. When laid on coals, or a red-hot iron, it flames and burns with a strong odour. The drops receive different names according as they are single, or joined together in pairs, or if of an unusually large size, or if several adhere to the bark from which they had exuded, or if powder has been rubbed from off them. This substance was formerly used as an ingredient in various chemical preparations, for curing numerous diseases. Externally it was applied to strengthen the brain and to heal wounds. It was also used to assuage the toothache.

Frankincense, as distinguished from olibanum, is softer, more resinous, and less active as a medical agent than the other. It is imported commercially in the form of little globules or masses, of a brownish or yellowish colour on the outside, but internally whitish, and variegated with whitish specks. It has a bitterish, acid, and unpleasant taste, and a faint odour. It is used in some medicinal preparations, but, like olibanum, it is not nearly so much employed in that way as in former times. *Bark of incense*, being the bark of the tree through which it has exuded, and *manna of incense*, being a powder resulting from the friction of the drops against each other, are sold in a distinct state, as possessing many of the properties of the sap itself.

It is in relation to incense-burning among the Jews that frankincense derives its chief importance. Among the notes to the 30th chapter of Exodus, in the 'Pictorial Bible,' is the following in allusion to this subject:—"There is nothing more ancient on the subject of incense and perfume than what this chapter contains. Of incense there is no mention in the offerings and sacrifices of the patriarchs; and it is equally true that in the early history of most religions we find no mention of incense. Theophrastus says, that anciently men offered no incense or odours to the gods, but only herbs, which they plucked and presented upon the altar as an offering taken from the earth. Ovid, also, speaking of the time of Janus, describes the sacrifices as being then without incense and without blood. This is all, however, with reference to Eastern Europe; but

aromatic offerings were known to the Arabians, Egyptians, and Hebrews, long before those times which were ancient to the Greeks and Romans. These have always thought themselves bound to offer to God part of that which was most precious among themselves, and hence incense was probably offered almost as soon as known. As Arabia was famous for its aromatics, which Egypt never produced, there is nothing improbable in the idea of Calmet, who, in his comment on this chapter, thinks that the custom of offering perfumes on the altar commenced in Arabia. The Israelites were at this time in that country, and it is not impossible that the Arabians themselves may have taken the idea from the Hebrews, of whose customs they must have obtained some knowledge. Offerings of incense were, however, very anciently in use among the Egyptians, but there is nothing to show whether the custom was in use among them at the period before us; we should rather think that it was, for the 'art of the perfumer,' according to which the incense was to be compounded, is not an art which any of the Israelites could have known unless they had learned it in Egypt. Plutarch says that the Egyptians offered incense to the sun—resin in the morning, myrrh at noon, and about sunset an aromatic compound which they called *Kypi*. This statement is corroborated by the incense altars which appear in Egyptian paintings." A representation is given in the work here quoted, of the probable form of the altar of incense used by the early Jews. It was about half a yard square, and a yard high, with a flat top on which to place the vessel for containing the incense.

When incense is spoken of by the early writers, frankincense, in one or other of its forms, was generally alluded to. The connection between it and *myrrh*, however, was so close, that we may almost deem them of equal importance in relation to the religious ceremonies. Myrrh probably occupied a medium place between an *incense* and a *spice*, having the qualities of both. This, like frankincense, is a kind of gum-resin, issuing by incision from the trunk and larger branches of a tree growing in Arabia, Egypt, and Abyssinia. Bruce, the celebrated traveller, communicated to the Royal Society a paper on the subject of myrrh, from which we can collect the results of his experience. He says:—"The ancients, and particularly Dioscorides, have spoken of myrrh in such a manner as to leave us no alternative but to suppose either that they have described a drug which they had never seen, or that the drug seen and described by them is absolutely unknown to modern naturalists and physicians. The Arabs, however, who form the link of the chain between the Greek physicians and ours, in whose country the myrrh was produced, and whose language gave it its name, have left us undeniable evidence that what we know by the name of myrrh is in nothing different from the myrrh of the ancients, growing in the same countries from which it was brought formerly to Greece, that is, from the east coast of Arabia Felix bordering on the Indian Ocean, and that low land in Abyssinia, on the south-east of the Red Sea, included nearly between the twelfth and thirteenth degrees of north latitude, limited on the west by a meridian passing through the island of Massowa, and on the east by another passing through Cape Guardafui. This country the Greeks knew by the name of the Troglodytria. The myrrh of the Troglodytes was always preferred to that of Arabia, and it has maintained this preference to our day. That part of Abyssinia being half overrun and settled—half wasted and abandoned—by a barbarous nation from the southward, very little commerce or correspondence has since been carried on between the Arabians and that coast, unless by some desperate adventures of Mohammedan merchants, made under favourable and accidental circumstances, which have sometimes succeeded, and very often likewise have miscarried."

This Abyssinian myrrh is exported from the country at a small island in the Red Sea, but the quantity is very small compared with that from Arabia. The natives use the gum, leaves, and bark for various diseases; and they also use the wood of the tree for timber, from which it results that a smaller quantity of the gum-resin is exported than would otherwise be the case. In order to have myrrh of the first or most perfect sort, the Abyssinians choose a young vigorous tree, whose bark is without moss or other parasitic plant. Above the first large branches they make a deep wound with an axe, and the myrrh which flows through this wound is the finest kind, but small in quantity. This operation is performed some time after the rains have ceased, that is, from April to June; and the myrrh exudes in July and August. The sap, when once accustomed to issue through the gash, continues so to do spontaneously at the return of every season; but the tropical rains, which are very violent and continue nearly half the year, wash so much dirt and lodge so much water in the gash, that in the second year the tree begins to rot and turn foul in that part, and the myrrh becomes thence of an inferior and lower priced quality. The myrrh produced from gashes near the roots, and in the trunks of old trees, is also of inferior quality. The worst kind is gathered from old wounds or gashes formerly made in old trees, or it consists of myrrh which has hung unnoticed on the tree for a whole year.

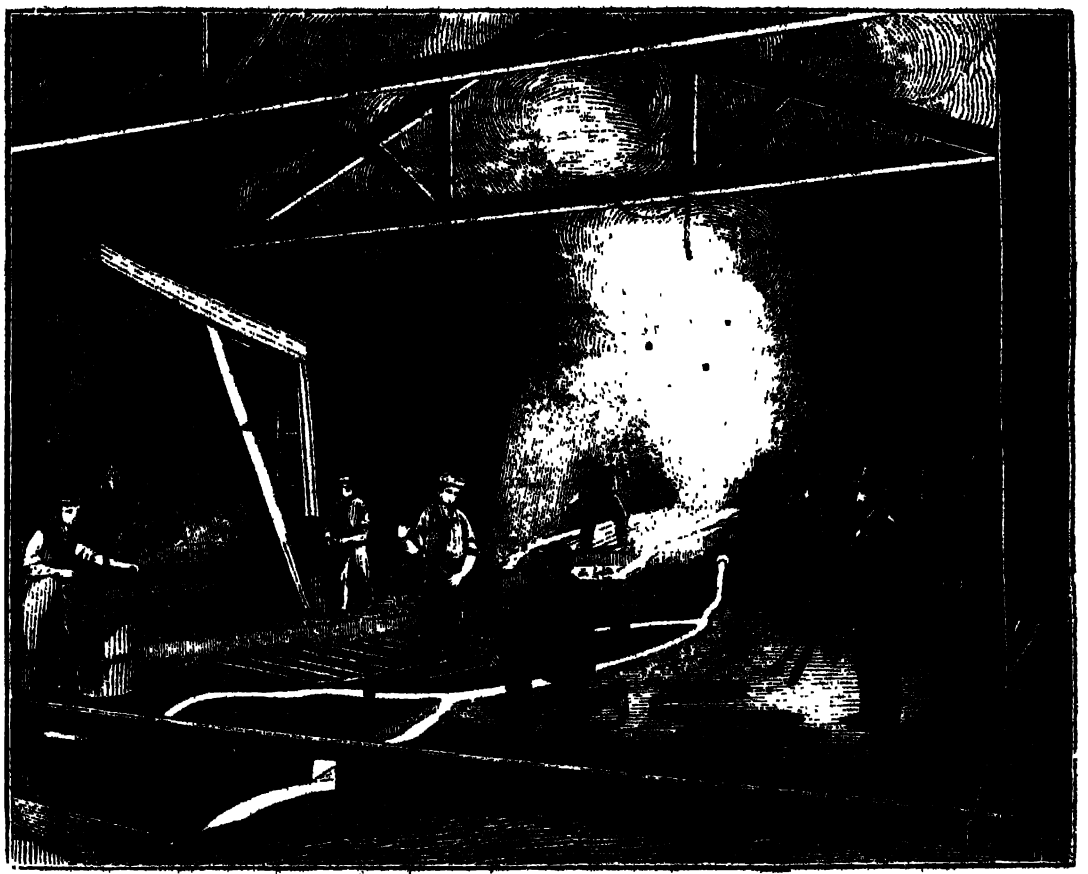
Bruce says:—"It may be remarked, that when we buy fresh or new myrrh, it has always a very strong, rancid, oily smell; and when thrown into water, globules of an oily matter swim upon the surface. This greasiness is not from the myrrh; it is owing to the savages using goat-skins anointed with butter (to make them supple), wherein to put their myrrh at gathering; and in these skins it remains and is brought to market."

Myrrh has a fragrant odour and a bitter aromatic taste. It is usually sold in two forms—*conglutata*, or nails, and *stacte*, or drops; the latter being the most pure and valuable. The stacte are translucent, of a reddish yellow colour, brittle, and easily pulverized. It does not melt when heated, and is not very inflammable. It is partially soluble in water, alcohol, and ether. By various modes of treating it, an extract, an essential oil, and a tincture are prepared. An "oil of myrrh" is prepared by enclosing some powdered myrrh in the white of a hard-boiled egg, and setting it in a moist cellar: the albumen becomes liquid, and imbibes nearly all the smell and taste of the myrrh.

Myrrh enters into the composition of many medicinal preparations, for both external and internal application, but its value in this respect has been rather lessened than increased by the researches of modern practitioners; not that it is found wanting in efficacy, but that other substances, more easily procurable, are at the same time more efficacious.

It is said in the 'Pictorial Bible':—"It has been recently ascertained that the myrrh is obtained from a species of *balsamodendron* which is very much allied to the *balsamodendron kata*, and its resin is now called *balsamodendron myrrha*. It is a native of Arabia, where it forms stunted groves, which are intermingled with species of acacia, moringa, &c." It is probable that the same circumstances which, in Bruce's time, prevented the Abyssinian myrrh from being so much known in other countries as that from Arabia, may be still in operation, and that, commercially, if not botanically, Arabia may be deemed the country whence myrrh is procured.

A DAY AT THE BUTTERLEY IRON-WORKS, DERBYSHIRE.



[The Foundry, or Cast-House, at the Butterley Works.]

AMONG the various manufacturing establishments which our country exhibits, there are few so important, so interesting to a stranger, and conducted on a scale of such great magnitude, as the more distinguished IRON-WORKS. Whether we go into South Wales, Shropshire, or South Staffordshire, into Derbyshire, or the West Riding of Yorkshire, or into the district of Scotland lying eastward of Glasgow, we find these smoking, fiery, ever-active works; where the precious metal iron (more precious by far than gold or silver in relation to the prosperity of a country) is extracted from the crude ore found beneath the soil. If the geological character of these districts be examined, it will be found that the iron-ore itself, and the coal which is necessary for smelting it, are found lying in beds or seams near each other; and that in some of the British mines not only may coal and iron-ore be dug out of the same pit, but they are actually combined in the same seam or bed.

The establishment, which, by the obliging permission of the proprietors, we are enabled to describe on the present occasion, is one of the most complete of its kind, and is well fitted for illustrating all the various points connected with the iron manufacture. From the mining of the crude iron-ore, extracted from the earth at a depth of five or six hundred feet below the surface, to the production of a highly finished steam-engine, every stage of the process is here conducted. Step by step is the value of the metal increased by the labour and skill bestowed upon it; and the means are afforded for seeing it in all its various states. The *Butterley Iron-Works*, to which we here allude, are situated in the eastern part of Derbyshire, near the confines of Nottinghamshire, and about four or five miles eastward of the Ambergate station on the North Midland Railway. There are in fact two works, the "Butterley" and the "Cedaor Park;" but as they are intimately connected, and owned by the same Company, we here speak of them as one.

On proceeding from the Ambergate station towards the works, we pass through the village of Ripley, inhabited for the most part by persons employed at the Works in various capacities; and immediately on leaving the village the flame and smoke of the blast-furnaces point out the locality of the Iron-Works. This ever-enduring flame is one of the most remarkable features of all such works, and is in Staffordshire especially observable, from the large number of furnaces there congregated. An iron-furnace is a most untiring laboratory: it works night and day, Sunday and week-day, never stopping an instant for months, or perhaps years together; it is always nearly full of fiercely burning materials, and is replenished at the top as fast as the product is drawn out at the bottom;

and its top being generally open to the air, a vivid body of flame is almost continuously shooting upwards, visible for many miles in every direction.

When within the gates of the Butterley Works, we find an area of many acres filled with various buildings incidental to the manufacture of iron. Of these the most important are three large blast-furnaces, with all the arrangements for producing either the hot blast or the cold blast. Those who have not seen a smelting-furnace (for they are called indifferently 'blast' or 'smelting' furnaces) have but little idea of their appearance. They are huge and clumsy erections, forty or fifty feet in height, and formed so as to possess great strength and great power of resisting heat. In some instances they are conical, like a glass-house; in others, such as have recently been erected near Glasgow, they are nearly cylindrical. At the Butterley Works they have a square horizontal section, and partake in their general appearance and construction much of the character of Egyptian buildings, especially in the opening which forms the lower mouth of the furnace. The furnaces are about forty-five feet in height: they are built of stone quarried in the neighbourhood, and are lined internally with fire-bricks and cement capable of resisting heat.

When we walk round these furnaces, we find that they are all three bounded on the eastern side by an embankment nearly as high as the furnaces themselves; and on ascending this embankment by a flight of steps, the surface of the embankment presents itself as a nearly level road, terminating at the furnaces at one end, and at the mines and collieries at the other. This arrangement, as we shall hereafter explain, affords great facilities for filling the furnaces. Near this embankment is a lengthened area occupied by an enormous heap of ironstone undergoing the preparatory process of roasting; some thousands of tons being thus strewed over the place.

When we descend from this elevation to the level of the works, and pass round to the front of one of the furnaces, we find all the busy and remarkable arrangements for casting the melted iron into sand moulds. A very large roofed shed extends in front of the mouth of each furnace; and the floor of this shed or foundry has in it various earthen pits in which to make large castings; together with cranes for raising and shifting ponderous vessels filled with the melted iron. If these places be visited about four in the afternoon, or perhaps still more at four in the morning, at which hours the furnaces are emptied of their liquid metal, the glare of light thrown around from the mouth of the furnace, on the swarthy persons of the workmen, as well as on the dark roof and walls, together with the current of white hot liquid metal as it flows to the moulds, presents a very striking scene. If one of our distinguished painters in oil (for plain black and white cannot represent such a scene) would condescend to visit an iron-foundry at such a time, and transfer to his canvass what meets the eye, he might produce a picture in which the play of light and shade would be remarkable enough, and might at the same time convey an idea of the warm work to which furnace-men are exposed.

Beyond and around the furnaces and their foundries are various other buildings pertaining to the manufacture of pig and cast iron (the Company's wrought-iron is made not at Butterley, but at Codnor Park); and the greater part of the remainder are occupied by engineers and machine-makers. The Butterley Company, as before observed, carry on this department, as well as the manufacture of iron. In some of the lower buildings are powerful machines of various kinds for working up iron and other metal into various parts for steam-engines and other pieces of mechanism. Planing-machines, for producing a perfectly level surface on a plate of metal of any size; lathes for turning shafts, pillars, and all other articles of metal having a circular section; other lathes for cutting screws of almost every diameter and size of thread; drills for piercing holes in metal, whether an eighth of an inch or three or four inches in diameter, whether through a mere sheet or through a thick plate; boring-machines for finishing circular surfaces which have been roughly produced by casting; filing-machines, for giving to small pieces of metal the form and smoothness which are usually given by hand-files;—these are some of the various machines with which the engineering shops are provided, by whose aid the workmen are enabled to fashion all the parts of a steam-engine or other piece of apparatus. Another fine room, recently built, is occupied by pattern-makers, who form in wood exact patterns and counterparts of all the articles which are to be cast in the foundry or made by the engineers. A lofty building, of a rougher and more ponderous character, is the *erecting-shop*, where all the steam-engines and other machines made are put together in a complete form, to see that every part performs its wonted office; the cranes for lifting are of vast power, and there are other arrangements for testing the strength and fitness of the various pieces of metal. In an open space of ground between some of these buildings, the larger structures of cast-iron are put together and adjusted before being sent from the works. All the arches, suspension-bridges, roofs, and other structures now so frequently made of cast-iron, are always put up in a more or less complete form at the works of the manufacturer before delivery; and a large open space is necessarily required for this purpose. In the open area above alluded to there are railways laid down, cranes erected, and all the appliances for raising and adjusting the ponderous masses of cast-iron which enter into the formation of such structures, many such masses often weighing from ten to twenty tons. Among the engineering-works thus made and adjusted at Butterley have been—Vauxhall Bridge, a fine railway bridge at Selby, another near Nottingham, bridges and castings for the Caledonian Canal, for Dublin Harbour, for Leith Harbour, for the East and West India Docks, and others of analogous character.

When on the level of the embankment which commences near the top of the blast-furnaces, we find a line of railway extending eastward. This railway is in connection with others, branching off at various points, and in different directions; the length and number of these branches being such that there are nearly twenty miles of railway on the whole works belonging to the Company. As soon as we get beyond the precincts of the Butterley Works, we find a pleasant open country before us, dotted here and there, however, with collieries and the mouths of iron-mines. All the open district between the two works, and to a great distance on either side and beyond, are in the hands of the Company; and as the seams of coal and iron-stone extend beneath the whole district, there have been numerous pits sunk for the extraction of these valuable materials. These may, in fact, be considered as so many distinct establishments; each colliery being under a distinct manager, who has under his care several pits or shafts, a large number of steam-engines, a body of miners, and all the arrangements for conveying the produce from the Works. Each colliery or establishment of this kind has a distinct name by which it is known. One of these, for example, the "Butterley Park Colliery," being the one nearest to the Butterley Works, has twelve iron-stone pits or shafts, five coal-pits, a steam-engine of 70 horse-power, for pumping the water from the mines; and eleven other steam-engines of smaller power, for raising the

miners and the materials from the pits. All the other collieries scattered over the Company's property resemble in their general features this one. The mode of descending the shafts is very convenient and expeditious. The shafts are lined cylindrically with brick-work, and there is an iron platform which nearly fits each, and which travels from top to bottom nearly as a piston would in a cylinder. We descended one in which the platform, containing four persons, was suspended by a flat rope made of iron-wire (one of the improvements of modern times), and a steam-engine lowered us all with swiftness and regularity to the bottom, a depth of five or six hundred feet. The various galleries of the mine, extending horizontally from the bottom of the shaft, were arched passages of the usual character, but tolerably clean and free from water; and miners were there at work, cleaving and blasting the iron-ore, and the coal afterwards to be used in the manufacture of iron. The various labyrinthine passages belonging to the different collieries form a net-work, extending beneath an area of about six square miles in extent.

When on the railway above, we may proceed onward nearly in a straight line from the Butterley Works to the Codnor Park Works, a distance of about three miles, or may follow any of the branch railways right or left to the various collieries. The Cromford Canal, passing through or close by a considerable portion of the district, affords great facilities for the transfer of materials and goods. After passing the Company's canal-wharf at a spot called Golden Valley, and a brick-work, which forms part of their busy circle of operations, we pass over a bridge which has beneath it a railway laid along an inclined plane, terminating at the lower end in a wharf on the banks of the canal, and at the upper end in a very extensive coke-work belonging to the Company. This is another interesting feature in the district; for wherever there is coal fitted for making coke, a new branch of trade may be established, deriving great importance from the extensive use of coke in locomotive engines. The employment of coke in smelting iron is, as we shall explain further on, not now so general as it has been; but the Company, after supplying their own wants, have established a large sale of coke from this spot. The appearance of the coke-work is altogether singular. On ascending the inclined plane, a range of about a hundred coke-ovens is seen, lying somewhat in horse-shoe



[Coke-Ovens.]

form. Each oven is a brick structure eight or ten feet high, having a flat roof with an opening at which to introduce the coal, and another opening in front at which to remove the coke. All being arranged contiguous, there is a railway running along the roofs of all of them, at a distance of two or three feet from the charging-holes. There is a colliery close to the ovens; so that the coal is no sooner drawn up to the mouth of the pit, than it is wheeled along the railway, and emptied into any one of the ovens. In these ovens the coal is kindled without access of air, and is deprived of its bituminous and more inflammable ingredients by the usual process of coking. When the coke is removed from the ovens, and ready to be taken away from the works, it is placed in carriages on the railway, and, by an ingenious arrangement of ropes, is allowed to descend the inclined plane to the canal by its own weight, drawing up at the same time a train of empty carriages to be refilled.

These are some of the matters which come under observation on the way from Butterley to Codnor Park; and on arriving at the latter, we find that it presents a large and busily occupied area, full of smoke and bustle. Iron is made at Codnor Park, as well as at Butterley, there being three blast-furnaces at each place; but the iron is in most cases applied to a different use. At Butterley the greater part of the castings are made, as well as all the engineering; while at Codnor Park wrought-iron is the chief product. The furnaces at Codnor Park are placed on a different level from those at Butterley, with respect to the railway, insomuch that the minerals cannot be thrown into the furnace in the same way. The railway bringing the minerals from Golden Valley and from the collieries is about at mid-height of the furnace; and from this level the coal, ore, and limestone are lifted to the level of the charging-hole; in two of the instances they are raised on a platform elevated by a kind of piston moving in a cylinder; while in the other case they are propelled up a very steep inclined railway to the mouth of the furnace. Contiguous to these furnaces is an enormous pile of ironstone, containing probably twenty thousand tons, either already roasted or undergoing the process of roasting, preparatory to that of smelting.

The interior part of the works is occupied chiefly by buildings incidental to the making of wrought-iron; the nature of which we shall notice presently.

After this general glance at what we may term the topography of the various establishments forming the Works, we shall be in a condition to trace briefly the order of processes carried on therein, so far as to show the broad features of the iron manufacture. The niceties and technical difficulties of the subject will of course not be touched on here.

In the first place, then, it will be necessary to show from what iron is made, and how it is found. Is it found pure or earthy, heavy or light, moist or dry? Is it found in small pieces or in large layers, deep in the ground or near the surface? Such questions are very likely to occur, and deserve a clear answer. The metal is found combined with various earthy substances in

a stony dark-coloured ore called *ironstone*, which ore differs in different districts, some containing a larger per centage than others of pure iron, some containing clay but no lime, some lime but no clay, some holding a small quantity of coal, while others have none; but nearly all containing water, silex or flint, sulphur, and carbonic acid. The ore occurs in beds of varying thickness; some of those at Butterley are from four to five feet thick, and as the beds are generally inclined to the horizon, there are parts where they 'basset' or 'crop' out at the surface, while at other parts the bed may be many hundred feet below the surface. There are generally a great many beds or seams one beneath another, separated by beds of other mineral; and in all such cases every bed has a local name applied to it. Thus, in the Butterley Park Colliery, the several seams of ironstone receive the somewhat odd names of the 'tan-yard,' the 'cement,' the 'black,' the 'blue,' the 'old man,' the 'whetstone,' the 'walls,' the 'nodule,' the 'stripe,' the 'kittle,' and the 'green meadow.'

We will suppose that any of these kinds of ironstone have been mined by gunpowder, brought up to the top of the pits, wheeled along the railway, and deposited near the blast-furnaces at either of the two works. The next question is—how to extract the metal from the ore. The other ingredients being almost utterly valueless, the object of the smelter's attention is to get as much iron as possible from the ore; and his plan is, first to drive off those impurities which will escape in the gaseous form, and then to act on the more refractory ingredients.

The process of *roasting* the ore is for the purpose of effecting the first of these two changes, as well as for bringing it into a state more readily acted on in the furnace. It is thus that the huge heaps which we have before alluded to, accumulate near the furnaces; all the stony masses being slowly burned or roasted in the open air before being thrown into the furnace. In some districts the roasting is effected in furnaces, the new ore being supplied at the top as fast as the roasted ore is extracted at the bottom. But we believe that at most of the larger works the roasting is effected in the open air; there is a layer of coal laid in a large level piece of ground, then a layer of ironstone in pieces of moderate size; then another layer of coal, and so on to the height of several feet, an external thatching or coat of small coal being laid over all. A fire is kindled at one end, and works its way slowly to every part of the mass, roasting the ore as it proceeds.

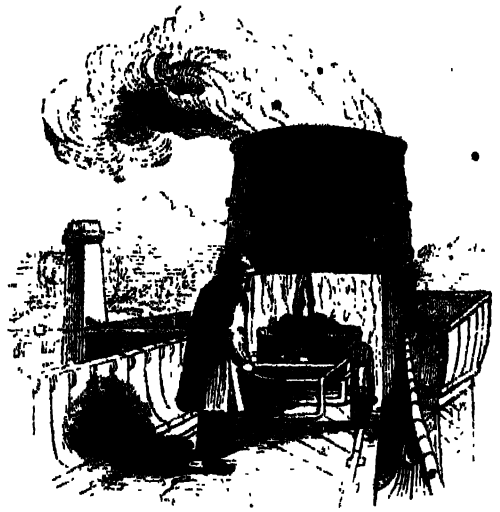
The 'raw-mine' or 'green-mine' (for the workmen apply the term 'mine' to what we have called ore or ironstone), being thus converted into 'burnt-mine,' it is ready for the blast-furnace, to have the earthen ingredients removed from it. This is done by a process which illustrates what by chemists is called 'affinity.' Lime and clay have a greater affinity for each other, or a greater tendency to combine together, than either of them with iron; and the smelter takes advantage of this circumstance to separate the metal from its accompanying impurities. If the ore be an argillaceous or clayey ironstone (which is generally the case), he adds limestone to it; if it be a calcareous or lime ironstone (which in some places occurs), he adds clay. Thus, the ironstone of the Forest of Dean in Gloucestershire contains lime, and requires clay as a flux or separator; while the ironstone of Derbyshire contains clay, and requires lime as a flux. The Butterley Company have very extensive lime-quarries westward of their iron-works, where the limestone is quarried in large blocks, and either burned into lime for sale, or conveyed by the Cromford canal to the wharf at Golden Valley, whence it is conveyed by railway either to Codnor Park or to Butterley, to be broken into smaller pieces before being introduced into the furnaces.

But something more is necessary than ore and lime; there must be fuel to generate a heat sufficient to effect the separation. This fuel is either coal or coke, and used to be charcoal. The changes from one to the other of these three kinds of fuel have marked important epochs in the history of the iron manufacture. Before the coal-mines were much used, and when our forests supplied materials for the fuel used not only for domestic purposes but in manufactures, iron was smelted with charcoal, as it is indeed at the present day in many foreign countries. Iron smelted with charcoal is, from the purity of the fuel, of very fine quality; but our national manufacture would have been almost utterly extinguished long ago, from the exhaustion of the supply of wood, had not the use of coal been introduced. The employment of coal, however, was not available in its native or raw state, since the sulphur and other foreign ingredients contained in coal would greatly injure the quality of the iron. It became necessary therefore to convert the coal into coke; and hence arose the construction of vast coking heaps or 'hearths' at iron-works. At some works the coke is made in ovens, as described in a former paragraph: while in South Wales and Staffordshire it has been the custom to place the coal in the open air, in heaps containing thirty or forty tons each, and allow it to burn in a smothered or confined manner, covering the heap externally with ashes and earth to keep in the heat—a process which adds much to the vivid glare of the district at night.

But the *hot-blast* bids fair to lessen and perhaps to supersede this wasteful mode of making coke, by affording the means of smelting with coal in its uncoked state. This most important invention we cannot well understand till after noticing the general operations of a blast-furnace, to which we will at once therefore proceed.

A blast-furnace of the usual construction has internally a square receptacle at the bottom, called the *hearth*, measuring about a yard in each direction. Above this is a cavity of varying shape, extending to the top, and in which the minerals are placed; the hearth being the receptacle for the melted iron as it flows from the ore. The proportion of the ingredients introduced varies according to circumstances; among others, by the introduction of the hot-blast. For one of the kinds of iron now making at Butterley (and which may be taken as an illustrative example), two tons thirteen hundredweight of roasted ore, two tons five hundredweight of coal, and one ton of limestone, are put into the furnace for the production of one ton of iron. The materials, as we before observed, are brought to the furnaces by railway from the pits. They are transferred to a most ingeniously constructed carriage, where there is an iron vessel suspended at one end of a long balance or steelyard, which can be so weighted as to balance with any given quantity of mineral in the vessel. The vessel is a cylinder with a loose conical bottom, apex upwards, and this bottom is capable of being lowered so far as to let the contents of the vessel escape. A given weight of coal is put into the vessel, and a man wheels along the carriage to the mouth of the furnace, which is about six feet square, and which exhibits a vast and fiercely heated body of flame from the mass of burning materials beneath. The carriage is wheeled on until the vessel passes into the furnace itself, and the man turns a handle whereby the conical bottom is lowered, and the coals precipitated in a circular stream into the furnace; after which the carriage is withdrawn, and a charge of ore and limestone similarly introduced. This mode of charging is a great improvement on the

common method, where the materials are thrown in from a hand-barrow in such a way as to fall unequally



[Filling the Furnace.]

in the furnace, falling to one side rather than to another.

The charges or fillings keep on uninterruptedly three or four times in an hour for day and night, never suffering further stoppage until the furnace is to be 'blown-out,' either for repairs or through depression of trade. As the mass within sinks as fast as it melts, so is the supply kept up by addition at the top, so that a furnace of such a size as those at Butterley usually contains about a hundred and twenty tons of burning materials at all times.

We next come to notice the *blast*, by which the requisite intensity of heat is maintained. So enormous is the mass of burning materials, and so great the heat required for the separation of the iron from the ore, that any of the ordinary modes of supplying air or draught would be inefficient: there must be a constant and powerful current irresistibly forced on by a powerful engine; and this current is called the blast. There are three apertures in the lower part of each furnace, on three sides of the hearth or receptacle, and in these apertures are inserted tubes called *twyeres* or *tuyeres*, analogous to the nose of a bellows. These twyeres are connected with a large reservoir or regulator filled with compressed air, the compressed air so stored being forced into the regulator by a powerful steam-engine, acting on the principle of a forcing-pump. If the air were forced by the engine at once into the furnace, it would produce an intermitting, irregular blast, almost powerless at one instant, and excessively strong in the next; an alternation which would greatly injure the operation of the furnace. A regulator is therefore provided (analogous to the fly-wheel of a machine), by which an equable supply of air is forced into the furnace. The blast-regulator at Butterley is an enormous cylinder of iron, thirty feet in height by nine in diameter, and therefore capable of containing nearly two thousand cubical feet of air. The success of the smelting process greatly depends on the manner in which this blast reaches the mass of burning materials, and there are various minor adjustments whereby this can be regulated. In the furnaces at Butterley the hinder end of each twyere has a hole covered with a piece of talc, through which the fire can be seen; and from the whiteness of the heat the smelter judges how the process is going on.

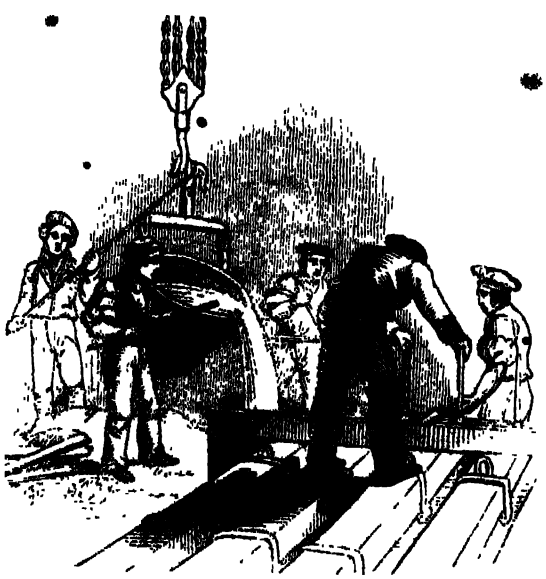
Now, it is the substitution of *hot air* for *cold air* in the above operations that constitutes the hot-blast system. The cold-blast has a tendency to chill the mass of melted materials on which it is projected, and it was long suspected that great waste of fuel resulted thereby. It remained for Mr. Neilson, however, of the Clyde Iron-Works, to introduce an efficient remedy. About fourteen years ago he took out a patent for warming the air before it was introduced into the furnace, conceiving that the quantity of fuel so expended would be amply compensated by the efficiency of that employed in the furnace itself. The invention made its way through many difficulties, and it gradually came into use throughout the iron-works of Scotland, and in many of those in England and Wales, under licence from the holders of the patent. The patent expired in the autumn of last year; and the use of this method is gradually extending, not only in this country, but on the Continent. At first the air was heated to about 300°, but as there seemed no reason why it should not produce better effects if heated yet higher, the temperature has been gradually increased to 600°, or equal to the temperature of melting lead. The principle is simply as follows:—Near the furnace is a stove-room, so arranged as to heat a series of iron pipes to any required degree of temperature. The pipes may be of any shape thought most desirable (at Butterley they have a rectangular section, measuring about nine inches by four); and the air passes through them on its way to the furnace, deriving heat (usually about 600° Fahr.) as it passes. One of the good effects of this system is, that it is found coal may be used in smelting, instead of coke, whereby a great saving is effected; and therefore in such works as those at Butterley, where coke used to be employed, coal is now used in the raw state, just as brought from the mine.

The liquid iron resulting from the action of the furnace is allowed to accumulate for twelve hours, at which time it is *tapped*, or allowed to flow out. There is a small hole at the bottom of the furnace, which is filled with clay after each tapping, and is broken open when the next tapping is necessary. In addition to this there is an opening somewhat higher, at which the scoriæ, or floating impurities, flow off from the surface of the metal: the colour, consistence, and general appearance of this *slag* denote to the smelter the mode in which the process is going on. The slag flows into cast-iron [illegible]s, and is thence removed to be used for roads, rough and other coarse purposes. The iron is generally cast into rough oblong pieces called *pigs*, in the following manner:—In front of the furnace is a flat earthen space covered with sand, and in the sand are made depressions or channels by a pattern, the counterpart of the pig. Down the middle of this space is one long channel, called the *sow*, from which branch off a hundred or more lateral channels or *pigs*, which, in the odd language of the workmen, "suck the metal from the sow." All being ready, the clay stopper to the hole in the furnace is broken away, and the white-hot liquid metal pours forth in a stream, and is conducted by a trough to the sow, from whence it branches laterally into the pig-moulds. One by one these moulds become filled with the glistening liquid, until at length the whole present a most vivid and remarkable appearance. The masses, or pigs, soon solidify, and are removed from the moulds while in a hot state; and the hole, or tap, is securely closed up preparatory to another similar train of processes.

Sometimes the metal, instead of flowing into pig-moulds, flows into a larger mould for forming some ponderous piece of cast-iron; but more frequently it is, for the latter purpose, received in ladles or large vessels, and from thence poured into moulds. We may illustrate this by noticing what came under our own view. A part of the supply of melted metal was re-

ceived in pig-moulds; while the remainder flowed into a very large iron vessel sunk in a hole in the sand. When filled, this vessel was raised by a powerful crane, swung round to another part of the foundry, where moulds for pipes had been prepared, tilted up, and the melted metal allowed to flow into the pipe-moulds. In some cases a vessel of white-hot liquid iron, weighing from one to five tons, is transferred from one crane to another, and thus conveyed to the end of the foundry, at a considerable distance from the furnace. In other cases, where more convenient, the pigs of iron are re-melted in smaller furnaces, called cupola-furnaces, and thence poured into moulds.

The mode of casting metal pipes, just alluded to, will illustrate many different varieties of iron-founding. There is formed, in the first place, a core or central pattern of cast-iron, with alternate grooves and ridges extending from end to end. Round this is wrapped a covering of hay or straw rope, and this rope is plastered with a layer of wet loam or clay, worked until the exterior surface becomes cylindrical, and corresponding in diameter with the internal dimensions of the pipe to be made. From this mode of formation it follows that there are hollow channels or gutters beneath the straw-rope, and these serve for the exit of heated air in the subsequent processes. The core, when formed, is sprinkled with powdered charcoal, and placed in a heated oven to harden. Meanwhile, the mould for giving the external form of the pipe is being prepared. A model, or pattern, is made, corresponding exactly with the exterior of the pipe to be made; and with this pattern a mould, or cavity, is formed in a smooth bed of sand, in two halves. Then, when the core is placed and supported concentrically in this mould, there is a cylindrical space between the two, equal to the thickness of the intended pipe. Holes for the admission of the melted metal, and others for the exit of the heated air, are provided, and the metal is poured in from the ladles or vessels before alluded to. It will be plain, on a little consideration, that the exterior of the core must give the interior form to the pipe, while the interior of the mould must give the exterior form to the pipe.



[Casting Pipes.]

In casting pipes of larger diameter, the core and mould are built up vertically in a pit as deep as the pipes are long; and matters are so arranged that the liquid metal is poured in at one end. In casting large cylinders for steam-engines and other purposes, the formation of the mould and core is a matter of much importance; each being formed of brick-work built up cylindrically, and of such dimensions that the larger may inclose the former, leaving a space between them equal to the intended thickness of the metal cylinder. The outer surface of the inner cylinder, or core, and the inner surface of the outer cylinder, or mould, are wrought very smooth and regular; and both cylinders being adjusted in a pit, melted metal is poured into the vacuity between them. Thus is the cylinder formed. The process of *boring*, to which such cylinders, as well as cannon and other articles requiring a smooth interior, are afterwards subjected, is not, as the name seems to imply, the boring or making a hole, but a planing, scraping, or cutting away of the inner surface, till it becomes regular and smooth from end to end.

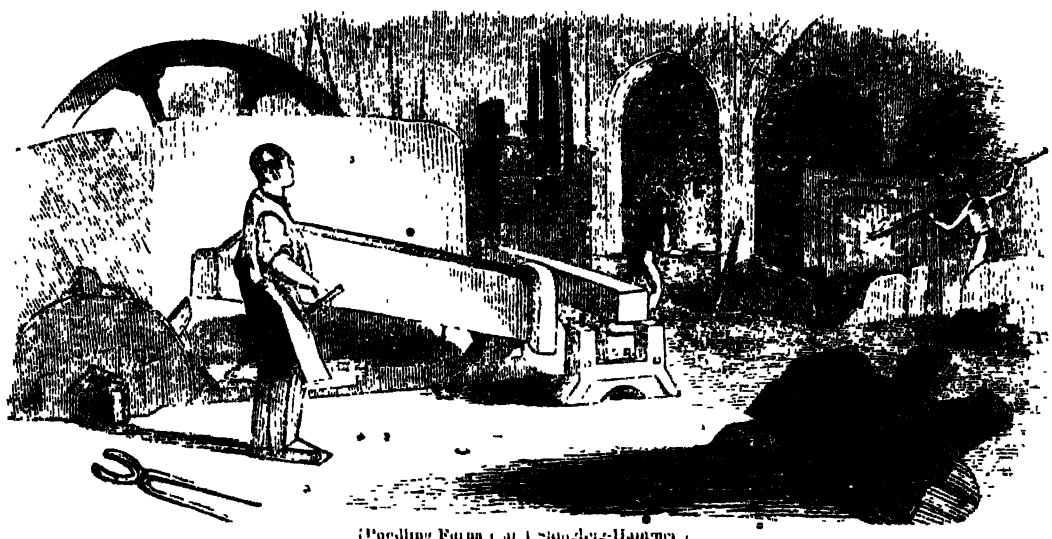
In all large specimens of casting, such as bed-plates for marine engines, arches for bridges, beams for mills, plates for large cisterns and tanks, turn-tables for railways, framework for engines and machines of various kinds, and such like, the mould is made in sand on the floor of the casting-house, from moulds or patterns previously constructed in accordance with the working drawings, and the liquid metal is poured into these moulds at once from the blast-furnace, or from the ponderous vessels, or from a cupola-furnace, according to the circumstances of the case.

Thus far the operations belong to what is termed iron *founding* or casting, and they constitute a series full of interest, both to the intelligent inquirer as well as to the mere spectator. But the production of *wrought*-iron, involving the operations of the *forge* and the *mill*, constitutes a distinct series, at which we must next take a rapid glance.

All wrought-iron is made from 'pigs,' and is therefore equally dependent with cast-iron on the operations of the blast-furnace. The pig-iron is of various qualities, according to the purposes to which it is to be applied: and we will suppose it to be such as is fitted to make railway-bars, or sheet-iron, or any other kind of wrought-iron. The masses undergo the process of *refining* as preparatory to the other operations of the forge. The carbon and the oxygen contained in the pigs of iron appear to be necessary to the process of founding, but to interfere with the production of malleable iron; and the process of refining, as well as the next one, of *puddling*, seems intended to drive off the greater part of these ingredients. The furnace employed for refining the iron is generally a low structure, having a hearth, or bottom, of fire-bricks, and the sides of cast-iron, made hollow to allow a stream of water to pass constantly through, as a means of preventing them from being burnt away by the intense heat within. There are doors at the sides for the introduction of the metal and fuel, and a brick chimney over. The pigs of iron are placed on the hearth of a low cast-iron furnace, and covered with coke and slag; they are then exposed to an intense heat, excited by blast-pipes, until the metal becomes thoroughly melted. An aperture in the lower part of the hearth is then opened, and the white liquid metal flows into a flat mould of cast-iron, where it is almost instantly chilled by means of cold water. These long slabs of refined iron are next broken in pieces, and put into the *puddling-furnace*, where the brittle texture is exchanged for one much more malleable and ductile. The puddling-furnace is one in which the flame and heat are reverberated from an arched roof, and made to strike down on the metal. The broken fragments of refined iron are placed upon a hearth or floor, and a fire kindled by the side in such

a situation that the flame passes over an intervening bridge, and is then reflected down upon the metal. This mode of applying heat has the effect of driving off the remaining carbon and slag. As soon as the iron begins to melt, the 'puddler' watches the progress of the operation through a hole in the front of the furnace, and by means of a long bar stirs the pieces of iron, till all are equally acted on by the heat. When once the whole is melted, the puddler keeps the mass constantly stirred, changing his bars every few minutes to prevent them from melting. This operation, which exposes the workman to a great heat, is continued until the iron, by giving off an elastic fluid, becomes thickened, and separates into pasty lumps. These lumps are so turned over and combined by the puddler, by means of his rods, or bars, that he forms the whole contents of the furnace into five or six masses, called *balls* or *blooms*, averaging probably sixty or seventy pounds weight each.

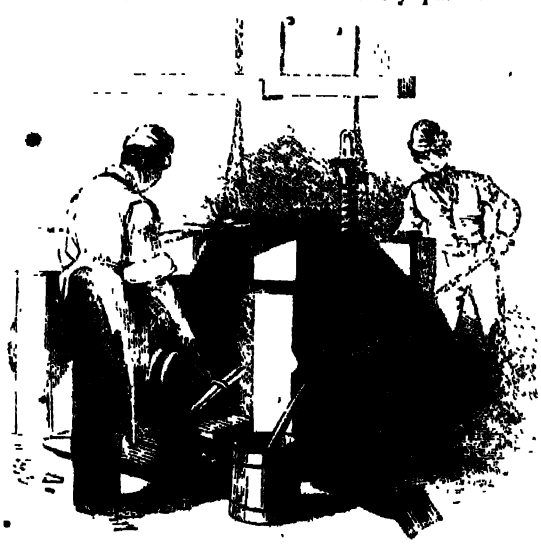
Then ensues a series of operations in which the fiery ball of iron passes from one workman to another with great rapidity, and gives a vivid and very bustling appearance to the forge-house. One of the blooms, or masses, is taken out of the puddling-furnace by means of a kind of tongs, and is quickly passed to the *shingling-hammer*. This ponderous machine, which



[Puddling Furnace and Shingling-Hammer.]

at the Ordnor Park Works weighs five tons, and requires a steam-engine of twenty horse-power to work it, is simply a hammer worked up and down several times in a minute. The bloom is placed under this hammer, and is speedily wrought into shape, the workman turning it round so that it shall receive blows on all its sides, until at length it is hammered into a square or rather oblong piece. Then, before this piece has time to cool, it is passed to the *puddle-rolls*, which consist of a pair of very large, hard, and heavy rollers working against each other, and having grooves on their surfaces. A man takes up the mass of iron, and places one end between the rollers: it is instantly seized by them while revolving, and passed between them, receiving at the same time an elongated form from the groove through which it passes. Another man behind seizes it with tongs as soon as it is protruded, and transfers it back to the first man, who passes it through a smaller groove, and so on until the iron presents the form of a rough flattish bar, two or three yards in length.

The iron is not yet in a finished or saleable state: it still retains some of its former brittleness, and has another heating process to undergo. The rough bars are cut into pieces, piled together in groups of five or six each, and placed in the *balling-furnace* (a name which will probably appear to be a very inappropriate one), shaped a good deal like the puddling-furnace. Here the bars are heated to a welding-heat, and when taken out they are passed through rollers acting in the same way as the puddle-rolls, but having grooves of a flat, square, triangular, or circular form, according to the shape to be given to the bars; or it may be that the grooves are such as will produce railway bars. By this mode of welding five or six bars together, the iron acquires a toughness and malleability which it did not before possess; and in the case of iron of very superior quality, the same process is conducted a second time. In every pair of rolls



[Rolling Bar-Iron.]

the grooves diminish in size from end to end, so that, as in the process of wire-drawing, the rod of iron becomes smaller and smaller at every successive drawing between the rolls. The two men, each with his tongs, manage the gradually elongating and still heated piece of iron, passing it to and fro, the one inserting it between the rolls, and the other seizing it

as it protrudes and passing it back to his fellow workman. Sheets of iron are made precisely in the same way, the rolls being of such a size, and having a flat surface, such as will lead to the production of a broad thin sheet, instead of a bar or rod.

The bars and sheets of iron thus produced have little more to undergo before they leave the Works. To reduce the bars to proper lengths, and the sheets to proper lengths and widths, they are subjected to the action of powerful shears, which cut the iron with a facility well calculated to astonish those who witness the process for the first time. The lower blade of each pair of shears is fixed, while the upper blade is moved slowly up and down by the power of a steam-engine; and the bar or sheet to be cut is held by hand on the lower blade, so that the upper one may act upon it. In the case of railway bars, which must fit very accurately end to end, and which must be very exact in length, this mode of cutting would not be precise enough. The bars are in this case placed on a bench, to which a gauge is attached, and the iron is cut by means of circular saws about a yard in diameter.

The business of the iron-maker here ceases. He has made bars and sheets of iron; and these now pass into the hands of others, who fashion from them the countless articles of everyday-life, from a nail to a



[Cutting Boiler-Plate.]

steam-engine. It will thus be seen that the Works which we have described exhibit all the successive stages of these processes. The quarries whence the limestone is wrought, the mines which yield the iron-stone and the coal, the canal and railways which transfer these minerals from one place to another, the ovens where the coal is coked, the ridges where the iron-stone is roasted, the furnaces where the ore is smelted, the casting into 'pigs,' the founding into large pieces for engineering, the refining, puddling, shingling, and rolling, whereby cast-iron is changed into wrought, and the working up of these materials into steam-engines and other finished machines—all are to be seen at the various works of the Butterley Company, and form a series both instructive and interesting.

A few words may here be added concerning what we may term the *social* or *moral* machinery of the place. Where the operations are extended over so wide an area, and partake of so varied a character, the number of persons employed must be very great. We believe that in busy times it amounts to nearly two thousand. As there are no large towns near, these workpeople form a sort of community, having not much intercourse with others, and this isolation gives to them many characteristic features. They have seldom shown a tendency to join in the outbreaks which have from time to time disturbed the manufacturing districts, and there seems to exist between the employers and the employed a kind of mutual confidence, productive of many good consequences. Nearly all the houses inhabited by the workmen belong to the Company, excepting, perhaps, those at Ripley. At the spot formerly spoken of, called Golden Valley, there is a village entirely occupied by the workmen; and nearer to Codnor Park there is another, presenting many interesting features. It is called, appropriately enough, *Ironmill*, and presents, with all due loyalty, its "King William Street," "Victoria Row," "Albert Row," &c. The houses are neatly built of brick: and are of such a character that a four-roomed house, with a neat little garden either before or behind, is let at about 4*l.* a year.

In the mode of paying the workmen, precautions are taken against abuses, which are too apt to occur where the employers do not keep a watchful eye. Most of the operations in an iron-work are conducted by "piece-work," that is, the men are paid according to the quantity of their produce. Where four or more men are employed on the same mass of iron, one man is generally master over the rest, and receives payment for the whole, giving to each man the amount of his earnings. In such a case it is required by the Company that the wages shall not be paid in a public-house, and that the payment shall be in money; the reason for the former rule is obvious, and the latter is to avoid the evils and injustice of the "truck-system." As an incentive to frugality, a Savings' Bank has been established at the works, where the Company allow four per cent. on all deposits from the workmen. There is also a sick-fund established, through which, by a small monthly subscription, the workmen ensure medical attendance, medicines, and a monthly allowance in money, when ill.

The little folks, too, are not neglected. It is a standing rule of the Company that no apprentice shall be received until he can read, write, and perform the earlier processes of arithmetic; and as this rule would press heavily on those who have not the means of acquiring education, the proprietors have built a large, commodious, and even elegant school, at Ironville, for the education of the workmen's children; and it is, we believe, in contemplation to build a church there likewise—the school being at present licensed for the Church of England service on Sundays. The school-house has two school-rooms; one for boys, and the other for girls. There are about a hundred of each sex attend the school, under the superintendence of a master and mistress, engaged expressly for the purpose. The usual and most useful branches of education are taught, and, in addition, vocal music is taught on the system of Mr. Hullah. In every large group of children there must of course be a considerable number who cannot make the least approach to correct singing; but there are in this school many who go through concerted pieces with an accuracy which would do credit to "children of larger growth;" some of them, too, being able to sing off a piece of moderately difficult music at sight. To hear a song adapted to the tune of Auber's "Prayer" in Masaniello, and such a glee as Webbe's "When winds breathe soft," sung, in three or four parts, by a little group of incipient miners or smelters—some in blue pinafores, and some in whitey-brown, and accompanied by their sisters (for both schools join occasionally in the singing-lessons)—is as novel as it is pleasant, as creditable to those who teach as it is welcome and beneficial to those who are taught.



Argynnis Paphia, 2. Vanessa Atalanta, 3. Polygonia Argus, 4. Hipparchia Pamphilus, 5. Melitæa Cinxia, 6. Neurobius Lucina, 7. Lycæna Phlæas.

CURIOSITIES OF BRITISH NATURAL HISTORY.

Butterflies.—No. III.

In our last paper on the Butterflies of our island we made some observations on their haustellate mouth, the structure of which we endeavoured to explain as succinctly as possible, comparing it with the mandibulate structure of the mouth as exhibited by coleopterous insects. In both instances we showed how the variations in the form and arrangement of the parts composing the mouth, whether those parts be modified into hard jaws or a slender tubular proboscis, were admirably in unison with the nature of the food on which the animal was destined to subsist. But it may be asked—Is the mouth only an organ for receiving and conveying food to the digestive apparatus? Do not insects also breathe through the mouth? and if not, how is respiration performed? Insects do not breathe through the mouth, whether mandibulate or haustellate; respiration is in fact carried on in a manner very different from that which obtains among the vertebrate classes. They have no lungs, like quadrupeds, birds, and reptiles; nor gills, like fishes. Insects breathe through a series of pores disposed in regular succession along the sides of the chest and body. These minute orifices are termed spiracles or stigmata. In many instances these spiracles, which may often be seen with the naked eye, are capable of being closed and opened; in some, however, they are always open and circular; and in numerous insects they are defended by a pencil of hairs in order to prevent the intrusion of dust or other particles. These spiracles generally lead to two main internal branches running longitudinally, and termed Trachea, whence multitudes of tubes are given off, dividing and subdividing *ad infinitum*, penetrating every part, and ramifying through all the viscera. These tubes appear generally to be simple, but sometimes assume a beaded appearance, and sometimes numbers of them are dilated at certain intervals into sacculi, or reservoirs, partly perhaps for the preservation of air, and partly, as is the case with the sacculi in birds, to lighten the specific gravity of the body. These tubes, however, are not confined to the body, they are continued into the wings, constituting the nervures, which are in fact air-tubes; and in such insects as fold up the wings, beetles for instance, most naturalists, we believe, consider that it is by forcibly impelling the air into these tubes that the expansion of the wings for flight is effected. Thus then, insects, it may be said, are permeated by air, and to this circumstance their vigour and energy are greatly owing; for every part of their organization and the nutritive fluids are under operation of oxygen; and as fast as the fluids (or blood) become deteriorated, so fast is it renovated.

If the multitude of these air-vessels surprises us, no less does their structure. As far as observation has hitherto gone, the trachea at least are found to consist not of a simple membranous tissue forming a cylinder, but of two exquisitely fine membranes, between

which a spiral thread is interposed, so as to form by its close gyrations a cylinder like the worm-spring of wire used in bell-hanging. The object of this wonderful contrivance is to give firmness to the tubes without interfering with their flexibility, to prevent their collapse without their being rigid or coriaceous.

The external signs of respiration are not always to be perceived in insects: in some, however, as the bee, the great dragon-fly, and the large green grasshopper, it is indicated by the alternate expansion and contraction of the abdomen, which M. Chabrier has described in detail. In the grasshopper M. Vauquelin found the inspirations to be fifty-five times in a minute. It is most probable that insects have the power of directing currents of air to any given parts and it would appear that the noise of many insects, as of bees, flies, &c., is produced by the forcible expiration of air. Messrs. Kirby and Spence consider that the vocal spiracles of the Hymenoptera and Diptera are those behind the wings.

With the function of respiration the circulation of the blood is intimately connected. In most animals we discover a more or less perfect system of blood-vessels, namely, arteries and veins; but in insects a complete vascular system cannot be detected: yet we would not assert that blood-vessels are altogether wanting; indeed, a dorsal vessel extending down the back is very apparent, exhibiting a series of pulsations towards the head, and in transparent caterpillars this vessel and its pulsatory movements may be seen with the naked eye.

We may here observe, that the chyle, or nutritive portion of the digested food, appears to percolate through the walls of the alimentary canal, filling up every space internally, and bathing the fine air-tubes, by the influence of the air of which it becomes altered in character, and analogous to the blood of other animals.—Such, at least, is the general theory.

Now to revert to the dorsal vessel:—This vessel contains a fluid which, according to Lyonnet, appears colourless, but when collected in drops is found to be of a yellow tint, more or less deep. A powerful microscope shows it to be filled with globules of inconceivable minuteness; when this fluid is mixed with water, the globules lose their transparency and coagulate in small clammy masses, which after evaporation become hard and brittle, like gum. The nature, then, of this fluid, and the regular pulsation of this vessel, favour the idea of the latter being a kind of heart.

Swammerdam, indeed, asserts that he has seen tubes issuing from this dorsal vessel, which he has succeeded in filling with a coloured fluid: but Cuvier and most writers have stated that it is not only closed at each end, but that there are no tubes leading to it or issuing from it, as is proved by the most elaborate researches. Lyonnet, who traced the nerves and ramifications of the bronchial tubes of inexpressible minuteness, could not, after the most painful investigations, detect either veins or arteries connected with this vessel, but regarded it as open at the anterior end.

Marcel de Serres states that the vessel can be removed without causing the immediate death of the insect; and many physiologists have been inclined to regard it as a secretory organ, but of what kind it was impossible to conjecture. This opinion we think untenable.

According to Meckel, it is furnished with longitudinal muscular fibres; but Strauss Durkheim found it, in the chaffer at least, to consist of an outer membrane and an inner lining of circular muscular fibres.

Strauss Durkheim's description of this dorsal vessel is very curious, and seems in some measure to reconcile the conflicting views which have arisen from the observations of other microscopic anatomists. This vessel, he states, is divided in the chaffer into eight compartments, by a series of semilunar valves, so constructed as to allow of the advance of the fluid upon the contraction of the vessel from the tail upwards to the head, but not of its retrograding. At the anterior part of the vessel the fluid issues through a perforation into the general cavity of the body, and meanders in streams between the various tissues; but as at each contraction, or systole, the vessel exhausts itself, there must be some means for keeping up a continual supply. It appears that each chamber has a valvular orifice on each side, communicating with the cavity of the body, and the valves are so ordered as to permit the influx of blood, but not the efflux; hence, as the vessel dilates after each contraction, a quantity of blood is sucked in, which, as it cannot return by the same openings, must go forwards, from the structure of the internal semilunar valves, and thus is it kept in perpetual circulation—so that though, exclusive of this long vessel or heart, there is no vascular system, yet regular movements and currents of the fluid bathing the viscera, the muscles, the air-tubes and other organs, are maintained. Both the contraction and dilatation of this kind of heart begin from the posterior chamber, and so upwards in rotation. The number of contractions varies; they have been counted at from twenty to a hundred per minute. Such is an outline of the account given by Strauss Durkheim: we need scarcely say that the extent and divisions of this vessel differ in various species. More recently (1824), Professor Carus has published his observations on the circulation, as investigated by himself in certain very transparent insects; and in addition to the meandering streams, evidently not confined by vessels, he considers that there is also a vascular circulation; that besides the main current discharged from the anterior orifice of the heart, "another portion of the blood is conveyed by two lateral trunks, which pass down each side of the body in a serpentine course, and convey it into the lower extremity of the dorsal vessel, with which they are continuous." Dr. Roget, in his 'Bridgewater Treatise,' figures this kind of circulation in the Semblis viridis, from a delineation by Carus, in the 'Acta Acad. Cæs. Leop. Carol. Nat. Cur.,' vol. xv., pt. ii., p. 9. It appears that these lateral vessels give off others, in the form of loops, supplying the antennæ, the tail, the legs, and the wings, which again return the blood to the lateral vessels, and these again merge into the dorsal heart. A similar circulation is asserted to exist in the Ephemera marginata, figured and described in Dr. Goring and Mr. Pritchard's 'Microscopic Illustrations,' and fully detailed and illustrated by an engraving on a large scale by Bowerbank in the 'Entomological Magazine,' i. 239, pl. 2.

In butterflies the circulation is not easily made out, owing to the opacity of their epidermis, and the full covering of hairs, plumes, and scales with which the wings and body are invested. Yet from their activity and alertness, and the vigour of the muscles necessary to the exertions of their fanlike wings, we may reasonably suppose it of as perfect a grade as in most or any insects.

Of these interesting creatures, children of summer, a beautiful group is at the head of this article: we shall give a brief description of them seriatim.

1. The Silver-washed Fritillary (Argynnis Paphia). This beautiful butterfly, sometimes called the Great Fritillary, is generally spread over our island, appearing in June about the sides of woods, and flitting on rapid wings. The upper surface of the wings is of a bright orange-brown, with three rows of black marginal spots, and with several black marks near the centre. The anterior wings are paler beneath, and the hinder wings beneath are brassy green, with four

transverse fasciæ of silvery white. The wings are ample. The caterpillar is solitary, feeding on the wild viola canina, the nettle, &c.: it is tawny, with a yellow dorsal line, and beset with hairy spires; two dark lines run along the sides.

2. The Pearl-bordered Likeness (Melitæa Athalia). This species, also termed the Heath Fritillary, is not uncommon in the more southern parts of England, and in Devonshire. It appears in June, and is found in the open glades of woods, and about heathy commons. It is subject to several variations of colouring, a circumstance which has led to some confusion of names. One variety is the Papilio Pyronia of Hübner. The ordinary colouring is orange above, with undulatory lines of black. The fore-wings beneath are pale yellowish, with a few transverse lines of black at the anterior margin. The hinder wings below, with several black-edged spots near the base, and a curved band of whitish across the centre, and edged with narrow lines of black, the fringed margin of the wing is yellowish. The caterpillar feeds on the plantain and also on the common heath. It is spiny, of a black colour, and spotted with white. To this species is referable the Papilio Maturna of some authors.

3. The Silver-studded Blue Butterfly (Polyommatus Argus), Blue Argus. This elegant little butterfly is not uncommon in the midland and southern districts of England, flitting about in June, over clover fields and ground where the broom grows abundantly, on which herbs the caterpillar feeds. The male and female differ much in colouring, the former having the upper surface of the wings of a deep blue, passing into black round the hinder margin, and bounded by a fringe of white. The wings beneath are bluish grey, with numerous ocellated spots, the hinder wings having on their posterior margin an orange band, containing silvery spots, margined by black crescents. The wings of the female above are of a dull brownish black, the anterior pair having a tawny margin.

The caterpillar is green, with a brown line along the back; oblique marks of brown, edged with white, along the sides: and black head and feet.

4. The small Heath Butterfly (Hipparchia Pamphilus), Golden Heath-Eye.

This species is common throughout the whole of our island, frequenting short-grassed hills, upland pastures, and dry heathy grounds, and appearing in June, a second flight occurs in September.

The wings above are of a pale orange or ochre yellow, with a fringe of long white hairs; underneath, the fore-wings are clouded with ash colour, and have near the tip an ocellated spot of black with a white centre. The hinder wings below are clouded with greenish brown and grey, with two or three indistinct ocellated spots.

The caterpillar is small and greenish, with the back dusky, and a white lateral line. It feeds on various upland grasses.

5. The Glanville Fritillary (Melitæa Cinxia).

On the adjacent continent this species is abundant, appearing in June; but in England it must be considered as of rare occurrence, though it is found in the Isle of Wight, on the hills about Dover, and along those of our southern coast. Its colour above is orange-red, marbled and spotted above with black and yellowish; a row of black points runs parallel with the posterior margin of the hinder wings. The colour of the wings is paler below than above.

The caterpillar is black, dotted with white, and with the head and pro-legs red; it is gregarious in its habits; numbers collect together, and drawing around them the leaves of the plant on which they are feeding, cover the whole with a web of silk: as it is not till late in the autumn that they emerge from the egg, and moreover as they pass through the winter before assuming the pupa state, this habit of clustering together, within a snug tent, is the more requisite. They feed on various plants, as the speedwell, hawkweed, mouse-ear, &c.

6. The Duke of Burgundy Fritillary (Nemeobius Lucina), small Fritillary.

This species is rare in our island, or rather, perhaps, local in its distribution, being chiefly confined to the south-eastern counties, appearing about the middle of May. It is said to be frequent near Cambridge. The wings are dark brown, the anterior pair having three transverse bars of irregular pale yellow spots, the marginal series being dotted in the centre with black. The hinder wings are almost similarly variegated. Underneath the wings are pale brownish yellow, the anterior pair having light spots interspersed with black in the centre, and a row of light spots, with a dusky mark in the centre of each, along the margin; the hinder wings are similarly ornamented, but have two bands of oval spots of a whitish tint, those forming the outer row being edged with black.

The caterpillar is stated to be oval, and depressed in figure, of a pale olive brown, with a black spot on each segment, and with the head and legs ferruginous. It is said to feed on the primrose and cowslip.

7. The common Copper Butterfly (Lycæna Phlæas). In every part of our island, and on the adjacent continent, this pretty butterfly is tolerably abundant; it extends to Asia, and occurs also in North America. It is light, quick, and active in its movements; and makes its appearance in June, July, and August. The anterior wings, which are not indented at the edge, are of a rich copper colour, spotted with black, and broadly margined with the same. The hinder wings are brownish black, with a copper band posteriorly, spotted along the margin with black. Under surface of the wings paler. This species is subject to considerable variations of colour.

The caterpillar of this butterfly is described as being of a green colour, with a yellow stripe down the back; it is said to feed on the sorrel. It appears to have been but recently ascertained.

We need scarcely observe that the varied colours of the wings of butterflies are produced by the minute plumes or scales with which they are covered, and which, beneath a microscope, present very beautiful objects. These scales are of very different forms, and variously arranged, but mostly in an imbricated style, with more or less regularity. They are inserted into the membrane by a short footstalk or root, but their attachment is comparatively slight, whence they are brushed off by a touch. Not only are they often richly coloured, but they are marked with striæ, and often crossed by finer lines, and these striæ by the reflexion of the light at different angles produce varying tints of brilliant or metallic effulgence. Some idea of the almost endless variety of form and markings which the scales of butterflies and moths assume, may be conceived when we state that Lyonnet nearly fills six quarto plates with crowded delineations of the scales of one species of moth, viz. the Bombyx Cossus. Such is their minuteness, that they appear to the naked eye like a fine powder, and their numbers on the wings of a large butterfly almost defy calculation. Leeuwenhoek counted upwards of 400,000 on the wings of a silk-moth, and it is calculated that in one square inch of surface of a butterfly's wing the number of scales will amount to about 100,740. When these scales are rubbed off, the wings are found to consist of an elastic, transparent, and very thin membrane: and when examined by means of a microscope, it will be found marked with indented lines, exhibiting the arrangement of the scaly covering.

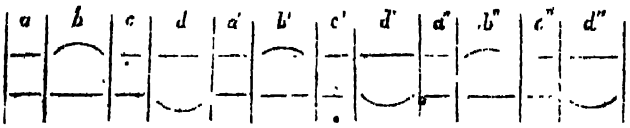
LOCOMOTION OF ANIMALS.—No. VI.

Walking.—By those who have studied the theory of walking, it has been found convenient to divide the time of a step into two portions, namely, that in which one leg, and that in which both legs rest on the ground; at least this arrangement has been adopted by Borelli, Weber, and Bishop. In walking it is necessary that there should be at least one foot always on the ground, and there is no instant in which the body is not supported either by one or both legs. In running, the case is different, as we shall hereafter see.

The period wherein both legs are on the ground is shorter than that in which the trunk is supported by one leg only. During the time the body is supported by one leg the other leg swings from behind forwards; and, being again placed on the ground, the first interval ends, and the other, namely, that in which the body is supported by both legs, begins, and terminates with the raising of the other leg. The time that the body is supported by both legs diminishes continually as the velocity is increased, and when it vanishes altogether, as in quickest walking, we arrive at the common limit of the quickest pace in walking and the slowest in running. Thus the two states in which the body is supported either by one or both legs alternate in such a manner that one begins at the instant the other terminates: and it is found by experiment that only in very slow walking is the time wherein both legs are on the ground equal to half that in which one only supports the body.

We will now endeavour to illustrate the preceding remarks by means of a diagram. In *Fig.* 1, which may be conceived to be a horizontal plane, let us suppose

Fig. 1



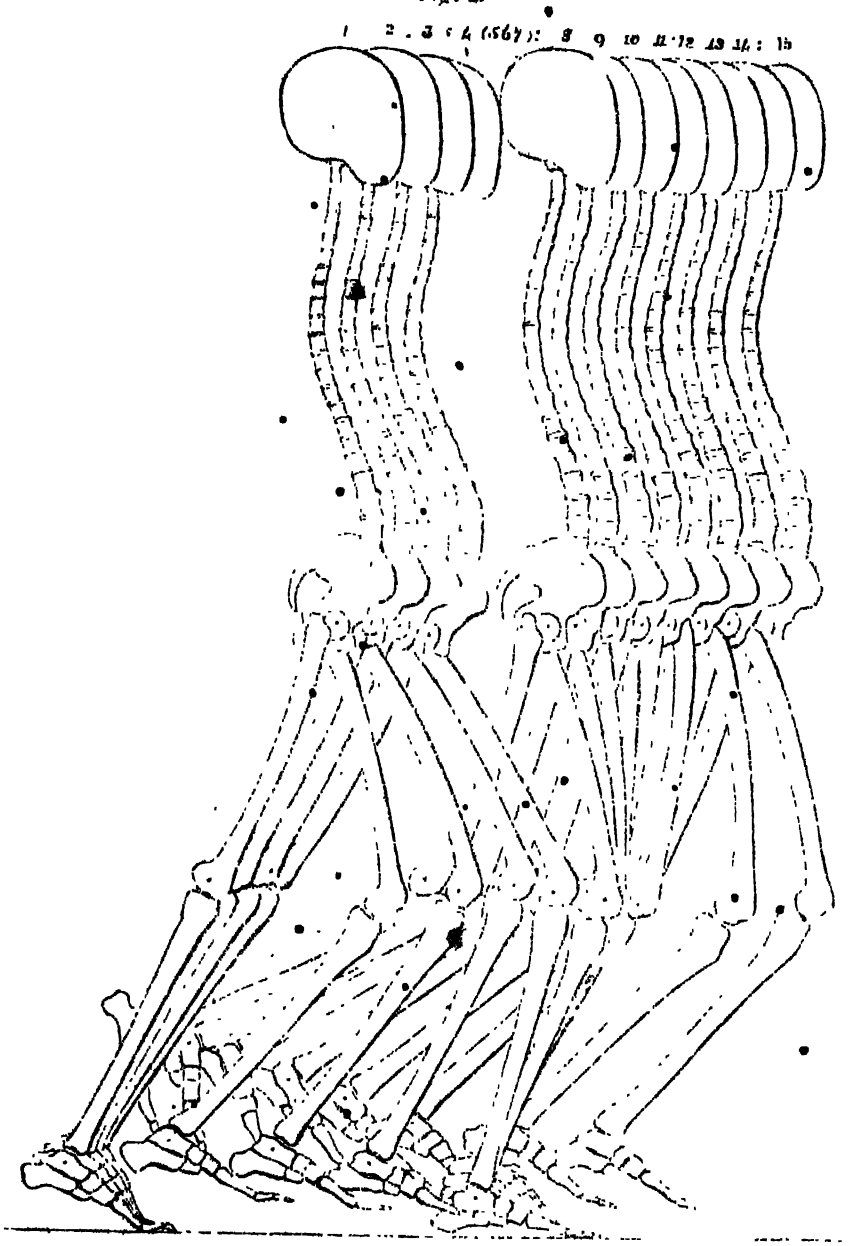
the upper series of lines to represent the left leg, the lower series the right, the straight lines the leg resting on the ground, the curved the leg swinging, and the letters *a, b,* &c. to denote the different periods of movement in walking. During *a* both legs are resting on the ground, and at the beginning of *b* the left leg rises from the ground, and swings forward until *c* commences, when both legs are again on the ground. During *d* the right leg in its turn rises and swings from behind forwards, whilst the trunk is supported on the left leg, represented by the upper straight line. At *a'* both legs are again in contact with the earth; at *b'* the left leg again rises in its turn, and swings as before; and thus the two legs alternate their offices in succession. We observe that the period *a*, in which both legs are on the ground, is about half of *b*, during which the left leg is oscillating, and the figure is consequently an illustration of very slow walking, agreeably to what has been already mentioned. It should also be remarked that *b*, the period of swinging, is the middle of the space $\frac{a}{2}$, *b*, $\frac{c}{2}$, which together constitute a single step. In *Fig.* 2 an outline of the human skeleton is represented in twelve positions as designed by Professor Weber, on a scale of one-tenth the natural size of man. The simultaneous relative positions of the head, trunk, and legs are preserved at each of these twelve instants, as viewed through a revolving optical instrument like a stroboscope, which has been adapted for this purpose by Stampfer. By means of this instrument the consecutive positions of the trunk and legs may be taken at very minute intervals of time, a subject of great importance to the sculptor and painter of animals, but which under ordinary circumstances could not be accomplished. In *Fig.* 2 the numbers 1, 2, 3 show the right leg on the ground, and the left leg swinging in advance of it, just before it reaches the earth at the end of the step, seen at number 4. The numbers 5, 6, and 7, which are omitted to prevent confusion, are the successive positions of the two legs resting on the ground before the next step commences with raising the right leg: during this period the centre of gravity moves forward, and the right leg, when raised, is as it were left behind, and is found in the position of number 8. Numbers 9, 10, and 11 show the successive positions of the right leg swinging behind the left: and 12, 13, 14, its positions when it overtakes and passes the left leg, until it reaches the last position, number 1, which corresponds with the number 1 of the other leg as above described. This excellent figure is necessarily complicated owing to the number of positions depicted; but is easily understood if studied with the attention it deserves.

In very slow walking, the centre of gravity is borne along in a more elevated position than in quick walking; indeed, whatever tends to elevate the centre of gravity, tends also to decrease the velocity of walking: for the length of the lundmost leg, which is nearly the same in all paces, is equal to the square root of the sum of the squares of the height of the centre of gravity from the ground, and of the length of the step; and consequently, the shorter the step, the greater is the height of that centre, and *vice versâ*. This is observable in corpulent persons; and in porters bearing burdens on the head and shoulders: the scientific law being thus confirmed by experience.

In slowest walking, the swinging leg passes through a less curve than in quick walking. In *Fig.* 3 we observe the leg is placed on the ground in advance of the vertical line passing through the head of the thigh-bone; and as a vertical line passing through the centre of gravity falls behind the base of support, the posterior leg cannot be lifted from the ground until the swinging leg has partially swung back again into a vertical position. During this period, both legs being on the ground, the time of the step is a maximum, because the duration of a step consists of the time employed by the swinging leg in describing its curve, and the time wherein both legs are on the ground, both which quantities increase as the velocity diminishes. In this case the straight lines, *a, Fig.* 1, have the greatest relative length with respect to the curved lines, *b*.

In quickest walking, the advanced foot reaches the ground in the vertical line which passes through the head of the thigh-bone, as in *Fig.* 4. Here the centre of gravity being entirely supported by the forward leg, the hinder leg is in a condition to rise from the ground the instant the other reaches it, and the time wherein both legs are simultaneously on the ground becomes evanescent. If the joints of the legs did not possess, as we have seen, a considerable freedom of motion, we should not be enabled to vary our speed as we now do; because, as the length of the step increases, the height of the centre of gravity decreases; and to accomplish the latter, the forward leg must be much more bent when it reaches the ground than in slow walking.

Fig. 2.



as seen in *Figs.* 3 and 4, the velocity of the man in *Fig.* 3 being little more than one half of that in *Fig.* 4 It is also in consequence of the power we possess of bending the legs, that we are enabled to move the centre of gravity nearly horizontally; and thereby to move with a much greater velocity than we could do if our limbs were inflexible; for a man with inflexible wooden legs is restricted from walking beyond a velocity within very small limits, however great may be his muscular power. For example, when a man is walking with wooden legs, as in *Fig.* 5, the centre of gravity describes small arcs of a circle, of which each leg is alternately the radius. Now, according to Dr. Young, if the velocity could be sufficiently great to create a centrifugal force exceeding that of gravity, each leg would be raised from the ground immediately after touching it, which would constitute running; for in walking the body is always supported, either by one or two legs; and supposing the inflexible leg to be three feet in length, the centrifugal force would become equal to that of gravity when the velocity in walking became equal to that which a heavy body acquires in falling through half the length of the leg, or one foot and a half, which is very nearly ten feet in a second, or seven miles in an hour. This, then, is the extreme limit of velocity which a man could reach with wooden legs, or with legs whose joints have been rendered useless by disease; but in reality he cannot move with anything like this speed, because he must place his swinging leg on the ground as much before the vertical through his centre of gravity as the other leg is behind it, and therefore his steps must be very short, and taken at a greater mechanical disadvantage than in the slowest walking of ordinary persons. In

Fig. 3.

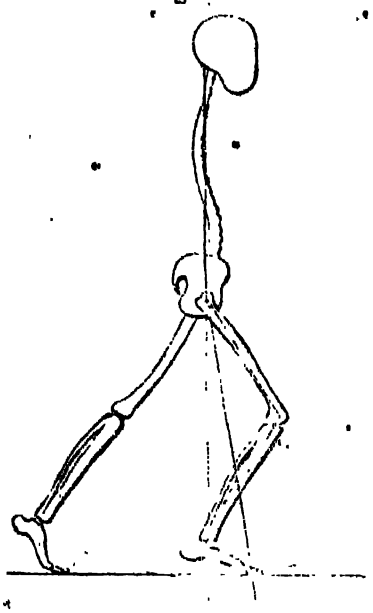


Fig. 4.

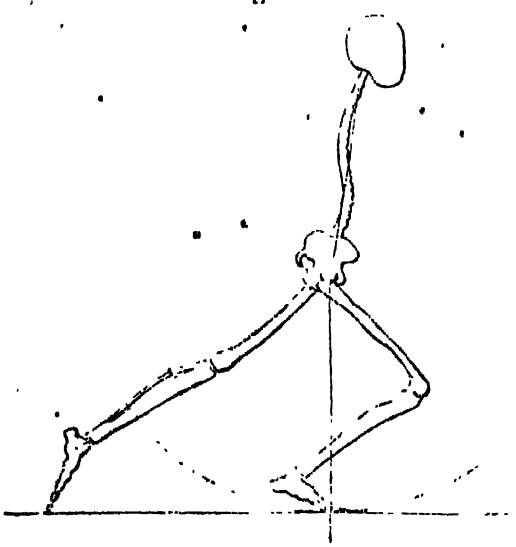


Fig. 5.

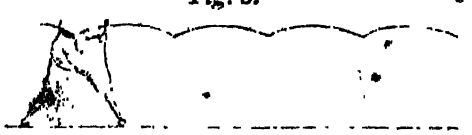
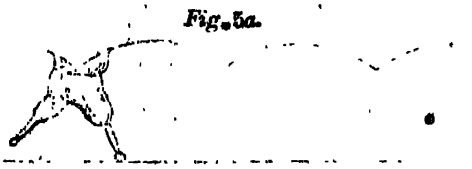
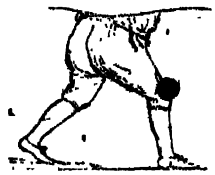


Fig. 5*a*.



consequence of the flexibility of the legs, the path taken by the centre of gravity undulates without forming any abrupt angles during its elevation and depression, as seen in *Fig.* 6, where the actual path resulting from the flexibility of the limb is delineated; whilst in *Fig.* 5*a* we see the abrupt manner in which the centre of gravity moves, and the curves begin and terminate; and we can readily imagine the jars to which the trunk would be subject in locomotion, if the legs were destitute of joints at the knee and ankle.

Fig. 6.



The greatest velocity with which a person can walk (unless by an enormous expenditure of muscular action, which could not be maintained) is when the time of a step is equal to half the duration of the motion of the swinging leg; that is, the time which elapses from the raising of that leg until it is again placed on the ground, having described half its arc of oscillation, the hind leg during the same time pushing the trunk sufficiently forward, so that the centre of gravity may be vertically over the base of support, as in *Fig.* 4. Hence, if we suppose the leg capable of describing its arc freely in ·730 parts of a second, the least time of the step will be 730 divided by 2, or ·375 of a second. When the swinging leg is first raised from the ground, the trunk propels the head of the thigh-bone horizontally forwards, and communicates a retrograde motion to the lower extremity of the leg in the direction of the tangent of the curve in which the leg oscillates. This retrograde force tends to retard the movement of the leg forward, and would materially lengthen the time of a step, but the leg being at the same time bent, and consequently shortened, to allow it to swing freely above the ground, its movement is thereby as much accelerated as the retrograde action tends to retard it, and the result is that the leg swings in the same time as if these accelerating and retarding influences did not exist. The velocity in walking, then, in the same person, depends on the time taken in making each step, and on the length of the steps, and both of these are again dependent on the height at which the centre of gravity, or the heads of the thigh-bones, are carried above the ground, for as the height of the latter diminishes, the length of the step is increased, and the time of the step is decreased, and *vice versâ*. The velocity of walking in different individuals depends greatly on the relative proportions of their framework, and on the vigour of their muscular system; but it must be borne in mind that it is always the hind leg which has the work to accomplish, and by throwing it into the required position, and regulating its extension, the speed may be adjusted to the figure of the individual. It is indeed owing to the dimensions of the several organs concerned in locomotion, and to the habit of the individual in applying them, that each person has a step peculiar to himself, so that the very sound produced by the contact of the foot with the ground is sufficient to enable us to recognise the approach of individuals with whom we are familiar, long before we see them. Compared with numerous species of the lower animals, the velocity of man in walking is very inferior. The best constituted persons are incapable of acquiring a speed of little more than five miles in an hour; and even at this rate of motion they are quickly exhausted. Our expenditure of muscular power for the accomplishment of every step is very great, even when walking on a perfectly horizontal

path; but it becomes much greater when ascending inclined surfaces, such as climbing the sides of hills and mountains. Under these circumstances the speed is diminished, and the muscular power is expended in raising the body upwards. During this period, the number of respirations, as well as the number of pulsations of the heart in a second, augments, and a feeling of languor and fatigue communicates to the pedestrian the conviction that he has done as much work as his system will sustain without danger of overfatigue, and too great a prostration of strength—a condition from which it often takes a long time to recruit. On the other hand, a due exercise of muscular action in walking is necessary, as we have already seen, to the healthy and vigorous play of the several organs of the human body.

BARBERS AND SURGEONS.

We are but too apt to overlook the slow and silent operation of the great principles upon which what is now known as the science of political economy are founded, although they are sufficiently curious and obvious, even in matters which might be deemed too high or too low to be thought within their influence. They prevail unconsciously in the progress of society from a low to a high state of civilization; and the painted pole and decayed teeth which formerly designated and ornamented the barber's shop, offer an exemplification of the results of a division and union of employments, interesting enough to justify a short notice of their history.

It is a remarkable fact that the curative art, an art so highly beneficial and even necessary to the well-being of mankind, should for a very lengthened period have existed entirely or chiefly in a merely auxiliary state. Without going into any historical proofs, we may state that in the earliest times it was auxiliary to the priesthood. In the middle ages it was practised by females of the highest classes, and, perhaps as a remnant of these ages in our own country, to a comparatively recent time, few villages were without their Lady Bountiful, who by their simples and specifics alleviated or aggravated, as it might happen, the ailments of the confiding rustics.

The union of the barber with the surgeon is not very distinctly traced. The Egyptian priests, it would appear, shaved, and in the legislation of Moses (*Leviticus*, chap. xiv.) concerning leprosy, the treatment of which disease was intrusted to the priests, he directs, on the recovery of a leper, that the head, eyebrows, and beard should be shaved. This could hardly be done by the patient himself. Civilization, however, gradually rendered the medical an independent, instead of an auxiliary art. Amongst the Greeks and Romans there were eminent medical practitioners; but in the East, where science dawned, but never attained its zenith, the medical profession was, and yet is, commonly united with that of the bath-keeper and the barber. In the middle ages of Europe it again merged into the priesthood, and monks and friars, with a few Jews, the disciples of the Arabians, were the general possessors of the healing art. But here superstition produced the same effect, for a time, that civilization would have more beneficially effected.

In 1163 the Council of Tours prohibited the clergy from performing any operations in which there was loss of blood. Surgery was also banished from the universities, under the pretext that the church held in abhorrence all kinds of bloodshed. This separation was the more readily effected in consequence of the barbers and bath-keepers having assumed the practice of surgery.

In France the Company of Barbers was formed in 1096, when William, then Archbishop of Rouen, prohibited the wearing of the beard. The bath-keepers, who pretended to much medical knowledge, by preparing medicated baths suited to different diseases and constitutions, and also by previously preparing the body by laxatives and venesection, shared with the barbers for a long period the practice of the healing art. Meanwhile the mists of the middle ages were gradually dispersing, and surgery, illumined by the science of anatomy, began its progress towards a new and brilliant position.

The profession of the barber, in the course of time, combined the art of the chirurgeon with the craft of the perruquier. In France the barbiers-chirurgiens were separated from the barbiers-perruquiers in the time of Louis XIV., and made a distinct corporation. The barbers of London were first incorporated by King Edward IV., 1461, and at that time were the only persons who exercised the art of surgery. But this consolidation of the two crafts could not be permanent. The gradual increase of wealth and luxury created a demand for superior skill in every department of medical and surgical science, and the consequence was, that persons of superior attainments began to apply themselves more to actual observation, and the acquisition of practical knowledge by a more careful study of the human body, and surgery was more enriched by the single discoveries of close observers than by all the preceding centuries of theory. These persons formed themselves into a voluntary association which they called the Company of Surgeons of London. The efforts of this association eventually effected the separation of the two crafts. By an Act passed in the 32nd of Henry VIII. these two companies were united and made one body corporate by the name of the Barbers and Surgeons of London, but it is remarkable that this nominal incorporation was their virtual separation, for the barbers were not to practise surgery further than the drawing of teeth, and the surgeons were strictly prohibited from exercising the feat or craft of shaving. This disjunct alliance continued till the year 1745, when, by an Act passed in the 18th of Geo. II., the barbers and surgeons were disunited and made two distinct corporations. Prior to this, however, many of the barbers, notwithstanding the legal prohibition, continued the practice of phlebotomy and the curing of wounds. The lute or guitar, as in former times, formed part of the furniture of the shop, which down to the reign of Queen Anne was frequented by a class of persons somewhat above the common level of the people. The musical instruments were for the entertainment of the customers, and answered the purpose of the newspaper, which in aftertimes became the great attraction of a barber's shop. The barbers for a long period were distinguished by a professional idiosyncrasy, which has been noticed by Steele in one of the papers of the 'Tatler.' In speaking of Salter, commonly called Don Saltero, a noted and eccentric barber, fiddler, and collector of curiosities, he asks, "Whence it should proceed that, of all the lower order, barbers should go further in hitting the ridiculous than any other set of men? Watermen brawl, coblers sing; but why must a barber be for ever a politician, a musician, an anatomist, a poet, and a physician?" But these professional peculiarities gradually disappeared, and the barbers lost caste. In proportion as the profession of the surgeon rose into eminence and renown, that of the barber sunk into insignificance and obscurity. Anterior to this degradation, the two crafts of the barber and the peruke-maker were conjoined, and during the reign of Ann, and subsequently, when periwigs were in vogue, that of the latter was in a flourishing state; but when, by the actual and complete separation of the barbers from the surgeons, the former declined in

importance and respectability, many of the wigmakers relinquished the feat of shaving, and established themselves as perruquiers, hairdressers, and perfumers.

Mr. Creech, in his statistical account of Edinburgh, records a similar revolution in the Society of Barbers, which affords an instance of the rapid progress of refinement, or perhaps the increase of luxury, in the metropolis of Scotland. "In 1703 there was no such profession known as a perfumer; barbers and wigmakers were numerous, and were in the order of decent burgesses: hairdressers were few, and hardly permitted to dress hair on Sundays, and many of them voluntarily declined it. In 1783 perfumers had splendid shops in every principal street. Some of them advertised the keeping of bears, to kill occasionally for greasing ladies' and gentlemen's hair, as superior to any other animal fat. Hairdressers were more than trebled in number, and their busiest day was on Sunday. There was a professor who advertised a hairdressing academy, and gave lectures on that noble and useful art. What is here stated of Edinburgh is, with few exceptions, applicable to London. In 1760 there were in the English metropolis a great number of petty barbers' shops, which in defiance of the laws then existing were open on Sundays, "their busiest day," and to which many persons resorted, not only to be shaved, but to be bled, for which they paid threepence, and frequently had their arms lamed. It was also common at this period for barbers to send their young apprentices into the Fleet, Marshalsea, Bridewell, and other prisons during divine service, to shave the poor prisoners gratis, that they might improve their hands before they practised on their masters' customers. Barbers' men, commonly called flying barbers, were likewise to be seen, even down to a much later period, running about on the Sunday mornings with wig-boxes, containing the newly curled and powdered wigs of those who, possessing only one of these ornamental coverings of the head, could not send them to be dressed until late on Saturday night.

"Bleeding, notwithstanding the legal prohibition, continued to be practised by many of the petty barbers till 1760. The shops of these professors presented a mean, dirty, and unsightly appearance; besides the parti-coloured pole* projecting from the door, there was in the lower part of the window a row of porringers, either of pewter or blue and white delf, filled with coagulated blood; while some of the upper panes were adorned with a fanciful arrangement of rotten teeth; and those artists who united to their vocation the art of dressing and renovating wigs, added the sign of an old grizzly peruke stuck on a wooden, featureless block.

Soon after this period, phlebotomy and shaving were completely disunited, and blood-letting, cupping, and the extracting of teeth became a distinct occupation. The bone-setters, another class of practitioners, who occupied themselves solely with the art of replacing dislocated or fractured bones, might now be considered as extinct. Here science had united the profession to that of the surgeon, who had studied anatomy. Wigs, which, from their varieties and general adoption, had for a long time been a source of emolument to the perruquiers, and given employment to a great many petty barbers and their apprentices in wedring of hair, were now going rapidly out of fashion; and their complete extermination, excepting a few instances, and those worn as forensic costume, was effected by the French revolution, which brought into vogue crops and Brutuses. Hair-powder was also going out of use, being relinquished by some to avoid the tax of a guinea per annum, levied on those who wore it; by others, to escape from the ridicule and odium of being pointed at and called *guinea-pigs* and *aristocrats*; and by a third party from political motives.

These changes in the fashions occasioned great distress among the barbers, especially those of the lower class. In 1792 the shops of those whose only employment was shaving and cutting hair were of the meanest description; the pole, which, being no longer indicative of their calling, had been for some time thrown aside, was succeeded by a lantern, about a foot and a half square, made of oiled paper, on which was inscribed, in black or blue letters, "Easy shaving," "Shave for a penny," or "The noted shaving-shop." These lanterns, which were suspended by a string fastened to a wooden or iron rod projecting over the door or window, swung and twirled in the wind, and at night, being illumined by a small candle, emitted a dull, hazy light, distinguishable enough amid the general gloom, which could scarcely be said to be even partially dissipated by the glimmering of the parish lamps.

[To be continued.]

* The barber's pole had its origin in the staff which was usually put into the hand of the patient while under the operation of bleeding; and which, when not in use, had the fillet that bound the arm entwined round it. The painted pole, though of much larger dimensions, represents such staff with its fillet wound round it.

The Kingfisher.—In No. 724 an account was given (from the "Penny Cyclopædia") of the nest of this bird, and of the different opinions held concerning it. A correspondent, the gardener of a gentleman near Buntingford, in Hertfordshire, evidently an acute and careful observer, has since sent us the result of his investigation, which we give in nearly his own words:—"A pair of kingfishers bred close to my garden last season, and not being so much acquainted with them as I wished to be, I paid particular attention to their habits. Their nest was in a perpendicular bank, ten feet high, of a somewhat sandy soil. They made the hole themselves, which inclined upwards for about three feet, and at the end was a circular hole eight inches in diameter, where they deposited their eggs. I often visited the place, and used to look into the hole, which was not sufficiently large to admit my hand, and was in a very filthy state. Being anxious to get the young, I did not disturb them until I thought they were ready to fly. I then took a garden trowel, and made the hole large enough to admit my hand, taking notice of the passage as I went on. The bottom was covered with fish-bones to the depth of one inch, quite dry. When I reached the end, to my great disappointment, the young birds had flown. Being vexed at losing the birds, and anxious to see them again, I often cast my eyes towards the spot. About ten days afterwards I was gratified to see the old birds begin a fresh hole, which I thought I would not be so tardy in visiting. They made the hole very quickly, using their bills as a picker, and scratching like a rat. I think Montagu is wrong as regards their building in rats' holes, as there were some close by, but they seemed to prefer a hole made by themselves (I say building, but they have not any nest). In a fortnight after the hole was completed, I went and opened it so as to get my hand in, when I found several fish, some whole and others partly eaten. The fish were of the sort called stoneroach, and much too large for the kingfisher to swallow. It has been stated that the birds have never been seen carrying any food in their bills to their young, and that the birds swallow their prey and eject it again. This I believe to be a mistake, as I have frequently seen the birds with their food in their bills, and finding these fish in the hole is a further confirmation of the fact. In this hole I found six eggs, of the same size, shape, and colour as described (in No. 724, i.e., "perfectly white and transparent, of a short oval form, weighing about a dram"). As soon as the old birds found their eggs taken, they immediately began a third hole, four feet from the last. In a few days I visited them again, made the hole large so as to get at them, and here I caught the old bird sitting upon one egg, making seven altogether, as there is little doubt but that this one was part of the number she intended to lay in the second hole. The bird was in a filthy state, as was likewise the hole. Whole fish, in a putrid state, were likewise found here. I do not think any pains were taken in making a nest of the bones, as they were scattered all about the hole alike."



[Ockwells.—From a View.]

OLD ENGLISH TIMBER HOUSES.

In England, previous to the reign of Henry VII., houses were commonly built with a framework of timber filled up with plaster. Even the humble cottage had its timber supports and 'smoky rafters,' though clay and turf might be used to fill up the spaces between the timbers, and thatch covered the rafters. Not only single houses in the country, but streets in villages, towns, and cities were formed of this kind of timber and plaster-work. In districts where stone was abundant, stone houses were occasionally built, but they were far from common. Leland, writing of Evesham, in Worcestershire, immediately after the destruction of its great abbey in the reign of Henry VIII., says, "It is meetly large, and well builded with timber. There be divers pretty streets in the town. In London, indeed, where, from the large number and contiguity of the houses, fires were more frequent and extensive than elsewhere, an order was issued as early as the first year of the reign of Richard I., which directed that the lowest story should be built of stone, and the roof covered with slates or tiles. In other cities and towns, however, where no such regulation existed, the entire skeleton of the house continued to be made of wood. There are still numerous remains of this street architecture in the more ancient towns of England, such as Exeter, Bristol, Chester, and Coventry, where specimens may be seen worthy of the study of the painter, as well as the architect: it has not been entirely swept away by the flat uniformity of brick walls even from the streets of London: specimens of it, but old and dingy, and not by any means in the best style, may still be seen in Bishopsgate Street, Shoreditch, Wych Street, near Middle Row, Holborn, and elsewhere. In some towns, as Exeter for instance, large and lofty houses still continue to be occasionally built with a timber framework and plaster walls.

The art of building with brick was introduced into England by the Romans, but in the troubled times which followed their departure it seems to have fallen into disuse, and so continued till the reign of Henry VII., though churches and castles, and occasionally houses, were built of stone. The mansions of the nobility were nearly all castles, with solid stone walls and massy gates, and those of the classes next below the nobility were castellated and fortified, at least all such mansions as were not within walled towns. The churches alone were safe, and, under the encouragement of kings and nobles, and wealthy churchmen, ecclesiastical architecture reached a degree of perfection which has not been surpassed in any age or country.

Little attention appears to have been paid to the external appearance of these half-timber houses in the disturbed and warlike times which preceded the reign of Henry VII., but from that period a great change took place. The wars of the rival houses of York and Lancaster were at an end. The terrors and anxieties which had accompanied those wars were no longer felt. Peace came upon the land like a calm after a succession of destructive storms, and the people's hearts, which had so long been "brimful of fear," were now as brimful of thankfulness and joy. Then there were games and sports in town and country, processions and masks, and the glorious old drama of England. Singing in parts was practised throughout the whole country, and madrigals and glees and songs resounded not only in palaces and halls, but in villages and farms, and the lonely cottage.

This was, comparatively at least, a happy time, and through six successive reigns of peace the domestic architecture of England continued to be cultivated, and, as far as regards external appearance, reached its highest state of perfection. The homes of England became as fair to look upon without, as they were happy within.

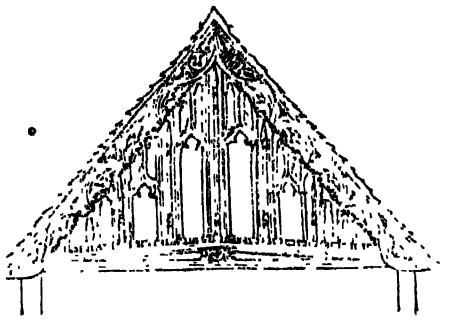
In the reign of Henry VII. some of the nobility and

wealthy classes began to build their houses with brick; but timber continued in use with the great body of the people, rich as well as poor. Not only houses in the country, but streets in villages and towns were formed of timber in the indigenous old style, but with especial regard to beauty of appearance.

This style of domestic architecture, which in its earlier state is called the Tudor style, and in its later state the Elizabethan style, may perhaps be appropriately called the style of the sixteenth century, commencing as it did at the latter end of the fifteenth century and terminating in the early part of the seventeenth. In its chief characteristics it is essentially Gothic, resembling that of the ecclesiastical buildings, but some parts are altered and others added to suit the difference between church architecture and house architecture. In the gables with their crowning pinnacles, in the porches, the doors, and the general forms of the mullioned windows, the resemblance is obvious; but chimneys, which are not required for the church, are characteristic of the house, and the overhanging of the floors and projection of the windows are still more striking characteristic differences. As the walls were formed of nothing more substantial than timbers and plaster, the overhanging of the stories was perhaps chiefly required to protect the walls from the weather. For the overhanging of the first-floor story there was another reason which especially applied to streets. Commodities of all kinds were exposed for sale in the open fronts of the shops, and were protected from the weather by the overhanging story. Less than half a century ago there still remained a silversmith's shop on Ludgate Hill which had a projecting story and open front, the plate and jewellery being offered to view in separate glazed frames. The convenience of the passengers also would doubtless be attended to in those times when umbrellas had not been brought into use. Ladies might go a-shopping even on a wet day, and walk the length of whole streets under a complete covering of overhanging stories. See a representation of old houses in Chester, in the 'Penny Magazine,' No. 256.

In these half-timber houses the framework of all the walls consists of horizontal beams resting on upright timbers, which are sometimes very close to each other; where the upright timbers are more distant, diagonal timbers extend from the top of one to the bottom of the other, and so on alternately. Sometimes the diagonal timbers are curved or angular, or are otherwise varied in form. The floors, as we have said, generally overhang each other, and the roof is often continued over the top of the framework, so as to form a protection from the weather at the top as well as the bottom. The roof, which was commonly high and sharp, so as to throw the wet off rapidly, was mostly relieved by dormer windows. The gables, which are extremely diversified and rich in their ornaments, are generally sharp in the inclination of their sides, corresponding with the steepness of the roofs: and the gable-boards, the horizontal foot-board, and the triangular centre are often elaborately carved and ornamented, and the apex surmounted by a richly decorated pinnacle.

Galleries and balconies of open carved-work were also frequent. The windows of the principal apartments were large and square, divided into compartments by mullions and transoms, which were not so massive as those of houses built of stone, but more rich in their tracery. Oriels or bay-windows are rarely wanting either in the side-walls or gables. The oriels are sometimes single, and sometimes compound, rising one above another from story to story. The doors are deeply recessed, with weather-mouldings above them in high relief. There are often porches to the entrances with small gable tops, corresponding with the larger gables of the house, and breaking with their deep shadows the monotony of the flat sides. In the larger houses there are sometimes turrets, and generally there are stacks of



[Carved timber Gable at Ockwells, Berkshire.]

ornamented chimneys which look like turrets, each shaft being usually of a different pattern. The projections throughout are bold, and the shadows deep; and the variety of form in the outline is almost infinite, displaying great variety of invention and consummate skill. Either in town or country the general effect is extremely picturesque. In towns, indeed, the streets were often narrow, and, from the overhanging of the stories, dark; but the passengers were sheltered from sun and shower. In other respects the houses were not crowded: trees and gardens were intermixed and the carved and painted gables, overhanging floors and galleries, and projecting windows and porches, must have had an effect in the highest degree varied and pleasing. In the country, the beautiful accordance of this style of building with rural scenery may be seen in the groups of cottages at Hadzor village, near Droitwich.

Mansions and manor-houses of timber architecture were built in great numbers throughout England during the whole of the sixteenth century. Many have been suffered to fall into decay, and more have been pulled down to be replaced by modern houses of brick and stone, flat, monotonous, and commonplace. But many of the old mansions still remain, some of which are as large as palaces, and as magnificent as they are picturesque. It is delightful to come suddenly upon one of them, standing with its gables and projecting windows and varied richness of decoration, among the trees which surround it.

Hulme Hall, of which we have given a representation, was one of these ancient timber manor houses. It was situated at a short distance from Manchester, on the bank of the Irwell. The manor in the time of Edward I. belonged to the family of De Rossendale. In the reign of Henry VI. it had passed to the family of Prestwick, in which it remained till 1660, when it was purchased by Sir Richard Moseley. In 1751 it was bought by George Lloyd, Esq., who, in 1764 sold it to the Duke of Bridgewater, in whose family it still remains. The manor-house had been long in a state of decay, and was let out to different tenants. It has been very recently pulled down, our drawing having been taken by T. F. Marshall just previous to its demolition.

Nearly all the old timber-houses which remain belong to the sixteenth century: the style underwent considerable change during that period; in the reign of Henry VIII. by Holbein, who introduced several continental variations, and in the reign of Elizabeth by the introduction of Italian designs and ornaments by John of Padua. John Thorp was the most celebrated architect of this period, and the names are known of nine or ten others who were eminent.

Of the larger timber-mansions yet remaining there

are several which are well worthy of mention. Ince Hall, near Wigan, is very large and lofty, the frame-work highly curious, and the general effect magnificent. Bramall Hall, two miles from Stockport, is also very large. The great hall is thirty-six feet square, with a spiral staircase of solid blocks of oak. Formerly a long and lofty gallery extended the whole length of the front, surmounting the roofs, and terminating at each end in a deep gable. A similar gallery still remains at Moreton Hall, near Congleton. The Oaks, in the village of West Bromwich, near Birmingham, is distinguished by the number and variety of its gables, by its central tower and high ornamented chimneys. Meer Hall, three miles from Droitwich, has two large end-gables, with five smaller gables between them. The frame-work of the upper stories is exceedingly curious. There are many others of large size and beautiful workmanship, and all of them are as rich in carving and ornament within, as they are picturesque on the exterior, of which alone we have treated in this short sketch.

BARBERS AND SURGEONS.

[Continued from page 80.]

The profession of the barber had now lost nearly all its exchangeable value, it no longer included the curing of wounds, the letting of blood, or the drawing of teeth, but was reduced to its primary elements of shaving and hair-cutting, and as most of those in the middle rank of society had become their own operators in the art of shaving, the employment of the mere barber was mostly afforded by the working classes, which, indeed, is the case at the present time: and it is remarkable that the shops of the *penny* and *halfpenny* shavers are again distinguished by the elevation of the parti-coloured pole, although it is no longer significant of the practice in which its prototype was used.

But an improvement in the taste, a refinement in the habits and manners of society in general, created a desire and demand for beauty and embellishment in all the various useful and fanciful arts, and called into existence, among others, a class of superior artists in the manufacture of ornamental hair. These persons, combining with their own art that of the hair-dresser and perfumer, opened splendid shops in the windows of which were exhibited—not the dull, dirty-looking "noseless blocks," surmounted with powdered wigs, but waxen busts of more than natural beauty, elegantly though partially draped, and adorned with hair redolent of essences and curls, which, whatever their colour, seemed to heighten the complexion into the most brilliant hues. These, together with ornamented combs, brushes, and bottles of essences, perfumes, cosmetics, and other articles of the toilet, presented a showy and attractive appearance, and formed a striking contrast between "The easy shaving-shop" and "The emporium of elegance and fashion."

While these mutations were taking place among the barbers, the profession of the surgeon, freed from its encumbrance, was rising into high repute. The superstition of the early ages, and the popular prejudice of later times, which prevailed against anatomical manipulations of the dead body, had been gradually overcome. Schools of anatomy were established in France, to which the surgeons of this and other countries resorted for the purpose of prosecuting their studies in dissection and improving their knowledge of the animal economy.

In England great improvements were made on the science by John Hunter, who was master of the anatomy of the human body, and ambitious of making his pupils as skilful as himself. From his time surgery made rapid advances, and the sphere of its utility was greatly extended, and the demand for its services increased, by the improvements and diversity of its instruments, there being now upwards of a hundred varieties, more than half of which were unknown a century ago. To this variety and mechanical ingenuity and perfection of the implements joined to professional dexterity, much of the alleviation of human suffering is to be attributed. Thus the arts are always nurtured by the spirit of the age, and artists will be skilful in proportion as the age is intelligent and refined. A high state of civilization invariably creates a demand for excellence in the various productions both of nature and of art, and consequently for the exercise of the utmost skill and ingenuity on the part of every description of artists. Half a century ago dentists—if we except the extracting barbers—were scarcely known; but the desire for personal embellishment and comfort on the part of the wealthy, and the equally strong desire of obtaining wealth, or, at least, of bettering their condition on the part of some of the professors of surgery, brought into existence a class of practitioners calling themselves surgeon-dentists; and the same desire of obtaining personal ease and gratification, by an exchange of money for artistical skill, caused many medical professors to devote themselves almost entirely to the study of some particular branch of medicine or surgery, and hence arose oculists, aurists, chiropodists, &c. These subdivisions have been the occasion of great improvements in surgery, by allowing the attention, the judgment, and the manual dexterity of individuals to be directed and applied to some particular department of the science. Hence so great has been the improvement in the art of the dentist, and so greatly increased the demand for its productions, that its practitioners are now divided into two classes—*surgeon-dentists* and *mechanical-dentists*.

Another remarkable contrast—the result of the separation of the surgeons from the barbers—appears in the splendid museum which the talents of John Hunter, and the research, exertion, and liberal expenditure of the President and Council have collected within the walls of the present College of Surgeons, when compared with the museum in the Hall of the Barber-surgeons, the account of which, as recorded by Maitland, can scarcely be read without a smile.

The art or feat of barbery, as now practised, consisting of the simple operation of shaving, is not susceptible of that improvement which results from the division of labour; but formerly it included the cutting and dressing or trimming the beard (as well as the hair), and the various modes in which it was worn required considerable skill and different operations on the part of the practitioner to suit the taste of the times. We learn from Shakspere, in his 'Midsummer Night's Dream,' that in his time some wore strings in their beards; and in the humorous description given by John Taylor, the water-poet, of the beards in his time, we learn the variety and fancy of their forms, some of which are really curious. In his enumeration of what he terms the "strange and variable cut of men's beards," in which

> "some take as vain a pride
> As almost in all other things beside,"

he informs us—

> "Some seem as they were *starched stiff* and fine,
> Like to the bristles of some angry swine;
> And some to set their love's desire on edge,
> Are cut and prun'd like to a quick-set hedge:
> Some like a spade, some like a fork, some square,
> Some round, some mow'd like stubble, some stark bare;
> Some sharp, stiletto-fashion, dagger-like,
> That may, with whispering, a man's eyes outpike;

Some with a hammer cut, or Roman T,
Their beards extravagant reform'd must be;
Some with the quadrate, some triangle fashion;
Some circular, some oval in translation;
Some perpendicular in longitude,
Some like a thicket for their crassitude:
That heights, depths, breadths, triform, square, oval, round,
And rules geometrical in beards are found."

Starching the beard and curling the whiskers appear to have been very modish about two centuries ago. In the 'Life of Mrs. Elizabeth Thomas,' entitled 'Pylades and Corinna,' printed in 1731, we have the following account of Mr. Richard Shute, her grandfather, a Turkey merchant: "That he was very nice in the mode of that age, his valet being *some hours* every morning in starching his beard and curling his whiskers; during which time, a gentleman, whom he maintained as a companion, always read to him upon some useful subject." This custom is also alluded to in the following lines of Hudibras, whose mistress, in speaking of his beard, says—

"Though yours be sorely lugg'd and torn,
It does your visage more adorn
Than if 'twere prun'd, and *starch'd and lander'd*,
And cut square by the Russian standard."

The "Russian standard" is an allusion to the long and broad beards worn by the Russian nobility and gentry, till the time of the Czar Peter the Great, who compelled them to part with these ornaments, not only by laying a heavy tax upon them, but by the harsher methods of ordering them to be plucked out by the roots or shaved with a blunt razor. (See the 'Northern Worthies,' 1728.)

From this slight sketch it will, we think, be obvious that no art admitting indefinite improvements, and capable of exercising the highest attributes of the mind, can be kept in subservience to another profession, nor in union with one, like that of the barber, that is merely mechanical. Mankind, as increasing intelligence enables them to judge, prefer, at whatever price, the highest excellence in any profession that can be attained, knowing that in fact such excellence is in reality the cheapest. The numerous subdivisions we have noticed are a proof of the efforts and labour necessary in each department to ensure the highest degree of knowledge and skill; and even the barber, as a class, has elevated himself into the adorner, instead of the disfigurer, of the human form.

Nature the Architect of Society.—Human society is not like a piece of mechanism which may be safely taken to pieces, and put together by the hands of an ordinary artist. It is the work of nature, and not of man; and has received, from the hands of its Author, an organization that cannot be destroyed without danger to its existence, and certain properties and powers that cannot be altered or suspended by those who may have been intrusted with its management. By studying these properties, and directing those powers, it may be modified and altered to a very considerable extent. But they must be allowed to develop themselves by their internal energy, and to familiarise themselves with their new channel of exertion. A child cannot be stretched out by engines to the stature of a man, nor a man compelled, in a morning, to excel in all the exercises of an athlete. Those into whose hands the destinies of a great nation are committed, should bestow on its reformation at least as much patient observance and as much tender precaution as are displayed by a skilful gardener in his treatment of a sickly plant. He props up those branches that are weak or overloaded, and gradually prunes and reduces those that are too luxuriant; he cuts away what is absolutely rotten and distempered; he stirs the earth about the root, and sprinkles it with water, and waits for the coming spring: he trains the young branches to the right hand or to the left; and leads it, by a gradual and spontaneous progress, to expand or exalt itself, season after season, in the direction which he had previously determined, and thus, in the course of a few summers, he brings it, without injury or compulsion, into that form and proportion which could not with safety have been imposed upon it in shorter time. The reformers of France applied no such gentle solicitations, and could not wait for the effects of any such preparatory measures or voluntary developments. They forcibly broke over its lofty boughs, and endeavoured to straighten its crooked joints by violence: they tortured it into symmetry in vain, and shed its life-blood on the earth, in the middle of its scattered branches.—*Lord Jeffrey.*

Dunlop Cheese.—Dunlop cheese is made in the counties of Ayr, Renfrew, Lanark, and Galloway, of various sizes, from twenty to sixty pounds. After the milk is brought to a certain degree of heat (about a hundred degrees of the thermometer upon an average, though in summer ninety will be sufficient, and, on the contrary, during the winter, a higher degree will be requisite), it is mixed with the cream which had been skimmed, and kept cool. The milk is then poured into a large vessel, where the rennet is added to it, and the whole is closely covered up for ten or twelve minutes. If the rennet is good it will then have effected a coagulation of the milk, which is gently stirred; the whey then begins immediately to separate, and is taken off as it gathers, until the curd becomes tolerably solid. It is now put into a strainer the cover of which is pressed down with any convenient weight. After it has thus stood for some time, and is tolerably dry, it is returned into the first vessel or dish, where it is cut into very small pieces by means of a cheese-knife that is furnished with three or four blades, fixed on prongs from the handle, that cut in a horizontal direction. It is thus turned up and cut, every ten or fifteen minutes, and also pressed with the hand, until all the whey is extracted. The curd is now once more cut as small as possible, and salted, care being taken to mix it minutely with the mass. Lastly, it is put into a cheese or cheesmit, a stout dish with iron hoops, which has a cover that goes exactly into it; a cloth being placed between the curd and the vessel. If this state, it is submitted to the action of the cheese-press, whence it is occasionally taken and wrapped in dry cloths, until it is supposed to have completely parted with the whey. It is then laid aside for one or two days, when it is again examined; and, if there is any appearance of whey remaining, the pressure and application of cloths are repeated. As soon as it is ascertained that the whey is extracted, the cheese is generally kept for a few days in the farmer's kitchen, in order to dry it, before it is placed in the store, where a smaller degree of heat is admitted. While there, it is turned three or four times a day, until it begins to harden on the outside; when it is removed to the store, and turned twice a week afterwards. When the cheese is cured, various modes are adopted in preparing it for sale, which are rather injurious than beneficial; nothing further being requisite, besides turning it, than to rub it occasionally with a coarse cloth, especially after harvest, because at that time it has a tendency to breed mites. In some dairies, the cream is carefully separated from the milk; while in others, the milk is not all allowed to cool, but thickened as taken from the cow; it being thought that "if the milk is allowed to stand until the cream separates from it, the cream can never again be completely blended with it, or retained in the curd when set, and the cheese will seem to be considerably poorer." We have given this long account; for the Ayrshire dairy-people think that there is a great deal of mystery attending all these manipulations; but the only mystery consists in the cheese being honestly made of the milk, cream, and all; in particular, attention being paid to the temperature of the milk when the rennet is added, and that most accurately ascertained by the dairymaid's thermometer, the top of the finger; and, finally, in the cheese being dried in a cool place, without any painting, or sweating, or rubbing with grease or oil.—*Agricultural Gazette.*

Mental Blindness.—Talk to a blind man—he knows he wants the sense of sight, and willingly makes the proper allowances. But there are certain internal senses which a man may want, and yet be wholly ignorant that he wants them. It is most unpleasant to converse with such persons on subjects of taste, philosophy, or religion. Of course there is no *reasoning* with them, for they do not possess the facts on which the reasoning must be grounded. Nothing is possible but a naked dissent, which implies a sort of unsocial contempt; or, what a man of kind disposition is very likely to fall into, a heartless tacit acquiescence, which borders too nearly on duplicity.—*Coleridge.*



ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXII.

Fra Bartolomeo called also Baccio della Porta and Il Frate: b. 1469; d. 1517.

Before we enter on the golden age of painting—that splendid æra which crowded into a brief quarter of a century (between 1505 and 1530), the greatest names and most consummate productions of the art—we must speak of one more painter justly celebrated. Perugino, Francia, of whom we have spoken at length, and Fra Bartolomeo, of whom we are now to speak, were still living at this period; but they belonged to a previous age, and were informed, as we shall show, by a wholly different spirit. They contributed in some degree to the perfection of their great contemporaries and successors, but they owed the sentiment which inspired their own works to influences quite distinct. The last of these elder painters of the first Italian school was Fra Bartolomeo.

He was born in the little town of Savignano, in the territory of Prato, near Florence. Of his family little is known, and of his younger years nothing, but that, having shown a disposition to the art of design, he was placed under the tuition of Cosimo Roselli, a very good Florentine painter; and that while receiving his instructions he resided with some relations who dwelt near one of the gates of the city (La Porta San Piero). Hence for the first thirty years of his life he was known among his companions by the name of Baccio della Porta; Baccio being the Tuscan diminutive of Bartolomeo. While studying in the *atelier* of Cosimo Roselli, Baccio formed a friendship with Mariotto Albertinelli, a young painter about his own age. It was on both sides an attachment almost fraternal. They painted together, sometimes on the same picture, and in style and sentiment were so similar that it has become difficult to distinguish their works. Baccio was, however, more particularly distinguished by his feeling for softness and harmony of colour, and the tender and devout expression of his religious pictures. From his earliest years he appears to have been a religious enthusiast, and this turn of mind not only characterised all the productions of his pencil, but involved him in a singular manner with some of the most remarkable events and characters of his time.

Lorenzo de' Medici, called Lorenzo the Magnificent, was then master of the liberties of Florence. The revival of classical learning, the study of the antique sculptures (diffused, as we have related, by the school of Padua, and rendered still more a fashion by the influence and popularity of Andrea Mantegna, already old, and Michel Angelo, then a young man), was rapidly corrupting the simple and pious taste which had hitherto prevailed in art, even while imparting to it a more universal direction, and a finer feeling for beauty and sublimity in the abstract. At the same time, and encouraged for their own purposes by the Medici family, there prevailed with this pagan taste in literature and art a general laxity of morals, a licence of conduct, and a disregard of all sacred things, such as had never, even in the darkest ages of barbarism, been known in Italy. The papal chair was during that period filled by two popes, the perfidious and cruel Sixtus IV., and the yet more detestable Alexander VI. (the infamous Borgia). Florence, meantime, under the sway of Lorenzo and his sons, became one of the most magnificent, but also one of the most dissolute of cities.

The natural taste and character of Bartolomeo placed him far from this luxurious and licentious court, but he had acquired great reputation by the exquisite beauty and tenderness of his Madonnas, and he was employed by the Dominicans of the convent of St. Mark to paint a fresco in their church, representing the Last Judgment. At this time Savonarola, an eloquent friar in the convent, was preaching against the disorders of the times, the luxury of the nobles, the usurpation of the Medici, and the vices of the popes, with a fearless fervour and eloquence which his hearers and himself mistook for direct inspiration from heaven. The influence of this extraordinary man increased daily; and among his most devoted admirers and disciples was Bartolomeo. In a fit of perplexity and remorse, caused by an eloquent sermon of Savonarola, he joined with many others in making a sacrifice of all the books and pictures which related to heathen poetry and art on which they could lay their hands into this funeral pyre, which was kindled in sight of the people in one of the principal streets of Florence, Bartolomeo flung all those of his designs, drawings, and studies which represented either profane subjects or the human figure undraped, and he almost wholly abandoned the practice of his art for the society of his friend and spiritual pastor. But the talents, the enthusiasm, the popularity of Savonarola had marked him for destruction. He was excommunicated by the pope for heresy, denounced by the Medici, and at length forsaken by the fickle people who had followed, obeyed, almost adored him

as a saint. Bartolomeo happened to be lodged in the convent of St. Mark when it was attacked by the rabble and a party of nobles. The partisans of Savonarola were massacred, and Savonarola himself carried off to torture and to death. Our pious and excellent painter was not remarkable for courage. Terrified by the tumult and horrors around him, he hid himself, vowing, if he escaped the danger, to dedicate himself to a religious life. Within a few weeks the unhappy Savonarola, after suffering the torture, was publicly burned in the Grand Piazza of Florence, and Bartolomeo, struck with horror at the fate of his friend—a horror which seemed to paralyse all his faculties—took the vows and became a Dominican friar, leaving to his friend Albertinelli the task of completing those of his frescoes and pictures which were left unfinished.

He passed four years of his life without touching a pencil, in the austere seclusion of his convent. At the end of this period the entreaties and commands of his Superior induced Bartolomeo to resume the practice of his art, and from this time he is known as Fra Bartolomeo di San Marco, and by many writers he is styled simply Il Frate (*the Friar*); in Italy he is scarcely known by any other designation.

Timid by nature, and tormented by religious scruples, he at first returned to his easel with languor and reluctance; but an incident occurred which reawakened all his genius and enthusiasm. Young Raphael, then in his twenty-first year, and already celebrated, arrived in Florence. He visited the Frate in his cell, and between these kindred spirits a friendship ensued which ended only with death, and to which we partly owe the finest works of both. Raphael, who was a perfect master of perspective, instructed his friend in the more complicated rules of the science, and Fra Bartolomeo in return imitated Raphael into some of his methods of colouring.

It was not, however, in the merely mechanical processes of art that these two great painters owed most to each other. It is evident, on examining his works, that Fra Bartolomeo's greatest improvement dates from his acquaintance with Raphael; that his pictures from this time display more energy of expression,—a more intellectual grace, while Raphael imitated his friend in the softer blending of his colours, and learned from him the art of arranging draperies in an ampler and nobler style than he had hitherto practised; in fact, he had just at this time caught the sentiment and manner of Bartolomeo so completely, that the only great work he executed at Florence (the Madonna del Baldachino in the Palazzo Pitti) might be at the first glance mistaken for a composition of the Frate. Richardson, an excellent writer and first-rate authority, observes, that "at this time Fra Bartolomeo seems to have been the greater man, and might have been *the* Raphael, had not Fortune been determined in favour of the other." It is not, however, Fortune alone which determines these things; and of Raphael we might say, as Constance said of her son, that "at his birth, Nature and Fortune joined to make him great:" but this is digressing, and we shall return to the personal history of the Frate in our next Number.

[To be continued.]

EXPENSE OF FUNERALS.

THE circumstances which usually lead to the long retention of the dead before burial, according to Mr. Chadwick's Report, arise amongst the poor chiefly from the expense of funerals; in some instances from a natural reluctance to part with the remains of the deceased; and occasionally from a feeling of apprehension against premature interment. When a respectable artizan dies, his funeral is generally attended by neighbours, and fellow-workmen as well as relations, the number of mourners being usually from five to eight couple; and as the convenience of these parties must be consulted, it consequently happens, that if the death takes place on a Wednesday, the funeral is deferred to the Sunday-week following. But, undoubtedly, the strongest cause of delay is the difficulty of raising money for the expenses of interment, when, as is most frequently the case, the resources of the family have been exhausted by the cessation of wages and the expenses of illness. This difficulty is so great with the very poor, that cases have occurred in the metropolis of the bodies of children being found, and on the inquest it has been proved that the deaths were natural, but that the bodies had been abandoned rather than the friends of the deceased would apply for parochial aid.

A very interesting portion of Mr. Chadwick's Report is that which relates to the Burial Societies established by the working classes, for which subscriptions are readily obtained, when they cannot be induced to subscribe either for their own relief in sickness, or for the education of their children, or for any other object. In the town of Preston there are six large societies, in which nearly thirty thousand men, women, and children are enrolled; and the principal club comprehends fifteen thousand one hundred and sixty-four members, and expends above 1000*l.* a year, raised in weekly contributions, from a half-penny to a penny and three half-pence and twopence per week. In London there are about one hundred of these Burial Clubs, comprising from one hundred to eight hundred members each.

In most cases, the concocters of these schemes are an undertaker and a publican. They are conducted on the most erroneous principle: members of different ages contribute the same sum; and the society is often dissolved by the younger members (or they have a majority) sharing the stock, when they find that the rapid deaths of more aged persons threaten to lead to a similar termination. The meetings of these societies are held at public-houses, and lead to habits of drinking. It is calculated that the business of the Burial Societies at Walsall is not transacted without an expenditure of 1200*l.* a year in "drink."

But the evil does not stop here; for it is only a short time since some cases were brought to light in courts of justice, in which the deaths of the children were traced to the parents, the inducement to the commission of the horrible and unnatural crime being the readiness with which the allowances were obtained from burial clubs, in several of which the children had been entered. In one case a man had insured such allowances in nineteen different clubs. Mr. Chadwick remarks, that in life insurances the legislature has endeavoured to arrest the dangerous tendency of insuring beyond the interest; and he suggests that, in the case of burial societies, a short provision might be made prohibiting payments beyond the actual cost of interment, and directing the return of the subscriptions where they have been given to more than one club. This would, however, be directly at variance with the interest of the undertaker, the master-spirit in these associations, and who, on the death of a mechanic, endeavours, in the first instance, to ascertain of how many societies the deceased was a member, and then arranges the funeral accordingly; so that instead of the family of the deceased being benefited by his foresight, his savings are expended by the undertaker for his own profit; and the most vulgar feelings are gratified by all the costly and senseless paraphernalia of a "beautiful" funeral, as persons

even in the class above them are in the habit of terming these tasteless exhibitions.

The lowest average price of funerals amongst the working classes is about 4*l.* for adults, including a good strong elm coffin, bearers to carry the corpse to the grave, pall, and "fittings" for mourners. For children the average cost is 30*s.*; but these charges do not include ground and burial fees. For a tradesman of the lowest class, a class in a condition not much beyond that of a mechanic, the expense varies from 10*l.* to 12*l.*; and for a child would be about 5*l.* Amongst the middle classes an ordinary funeral, burial fees included, varies from 50*l.* to 70*l.* In providing on these occasions "what is customary," the undertakers have methodized a system, from which it is difficult to depart, although in their hands the solemnity is conducted with most egregious violations of common sense, of which they themselves are not aware, nor are the public; but the following questions addressed to an intelligent undertaker, fully brings out the absurdity of the custom which they have succeeded in establishing —"Are you aware," it was asked, "that the array of funerals commonly made by undertakers is strictly the heraldic array of a baronial funeral, the two men who stand at the door being supposed to be the two porters of the castle, with their staves, in black; the man who heads the procession, wearing a scarf, being a representative of a herald-at-arms; the man who carries a plume of feathers on his head being an esquire, who bears the shield and casque with its plume of feathers; the pall-bearers, with batons, being representatives of Knights-companions-at-arms; the men walking with wands being supposed to represent gentlemen-ushers, with their wands?" To this question the answer of course was, "No, I am not aware of it." It is these non-essential parts of the ceremony which render funeral expenses so heavy, and which, amongst the middle classes, frequently lead to the impoverishment of the survivors. The cost of the mutes ("the two porters of the castle") varies from 18*s.* to 30*s.* each; and when they are attired in silk scarfs or "fittings," including hat-bands and gloves, the sum of five guineas is charged; and half this sum for the person who walks with a scarf. The charge for the feathers borne on the head before the hearse, and the "fittings" of the man who carries them, is about three guineas and a half; and for each of the men who bear batons about a guinea; and each man bearing a wand about the same sum. There are, besides, charges for "velvets" attached to the hearse, including feathers, and feathers to the horses, the cost of which varies from ten to fifteen guineas; and from one to four guineas is charged for the pall. A silk scarf of three yards and a half, and a silk hat-band and black kid gloves, are in many instances given to the clergyman who performs the funeral service; the same to the clerk; and in order to increase his gains, the undertaker bestows a perquisite of the same nature on the sexton; though it is usual to compound the matter by giving to clergyman, clerk, and sexton money instead. The number of men employed at a "respectable" funeral is about twenty; for if the coffin be a leaden one, it requires about eight men to bear it. In the case of funerals of persons of "moderate respectability," the number of attendants would be about fourteen. The expense in the former case would be about 100*l.*, and in the latter about 60*l.* About 50*l.* would be a low average for the ordinary expense of tradesmen's funerals; and of the children of this class, below the age of ten, about 14*l.* Of persons of the condition of a gentleman, 150*l.* would be a low average; and for a child of this class about 30*l.* The funeral expenses of persons of rank and title vary from 500*l.* to 1500*l.*, but a large part of this cost is incurred in the removal of the body to the family vault, in a distant part of the country, by a long cavalcade moving by very slow stages; and here the railways have diminished the expense, in some cases, to the extent of 500*l.* Out of 5*l.* expended for the common funeral of an adult artizan in London, about 15*s.* will be for the burial dues; and of this 15*s.* the clergyman will receive about 3*s.*

To persons of the condition of the widows of officers in the army or navy, or of the legal profession, or of persons of the rank of gentry who have but limited incomes, the expenses of funerals often subject them to severe privations for the rest of their lives. These expenses are often incurred equally against the wishes of the deceased and of the survivors, and originate in the circumstance that the funeral arrangements and the determination of what is "proper," and what customs shall be maintained, fall to those who have a direct interest in a profuse expenditure. One case is mentioned of a clergyman's widow who was left in narrow circumstances, and conceiving it her duty to have a respectable funeral, she gave general orders to that effect; but in the vocabulary of the undertaker respectability means expensiveness, and the expenses of her husband's funeral cost the widow 110*l.* A case is mentioned (in the circular of a respectable undertaker) of a widow who stated that her husband's funeral cost upwards of 100*l.* (all the money she possessed), and on being asked how she could incur such an expense, her reply was, that she ordered the undertaker to provide what was respectable, and to avoid expense. An executor who had ordered a coffin and service of the "most simple description," conformably to the intentions of the deceased, expecting the coffin to cost not more than 5*l.*, having, under peculiar circumstances, occasion to call for the bill previously to the interment, found, to his surprise that instead of 5*l.*, the charge for the coffin amounted to nearly 20*l.* "What," he says, "could be done? we could not turn the body out of the coffin: I would have paid double rather than have disturbed the peace of the house on that occasion." The circumstances attending a death encourage extortionate charges, and are no less favourable to complete impunity; and another reason for the success of the system of expensive funerals arises from their being so frequently paid out of trust-funds of the higher and middle classes. It is high time that our funeral customs were subjected to a strict scrutiny, and efforts made by the intelligent portion of the public to get rid of the superfluous sort of mockery which is imposed upon them, under the plea of its being "customary," by a class whose taste it seems absurd in the last degree to follow.

Mr. Chadwick estimates the total expenses of funerals in England and Wales at 4,871,193*l* annually, and this sum is probably under the real amount. The average cost of funerals of persons of every rank in London is 15*l.*, and the total sum annually expended is above 626,000*l*. Still more valuable are the inferences he draws in connection with the inequality in the number of deaths in different districts. Thus amongst the poorer classes, living in wretched habitations, as those comprised in Bethnal Green and Whitechapel, there is one burial to every 31 inhabitants, whilst in the contiguous district of Hackney there is only one burial to every 56 of the inhabitants yearly. Had the annual mortality amongst the population in the high, open, and naturally-drained district of Hackney been the same proportionate amount of mortality as that in the contiguous, but low, ill-drained, ill-cleansed, and ill-ventilated district of Bethnal-Green and Whitechapel, instead of 759 deaths per annum, Hackney would have upwards of 1138 deaths, and an expense of 5448*l.* more for funerals during the year. If the same rate of mortality prevailed in the county of Hereford

as in Liverpool, there would be 1488 more deaths annually, and an additional expenditure of 21,390*l.* per annum in burials. Again, the excess of deaths in the metropolis above the healthy standard of Islington or Herefordshire, of one in 55, is 11,266, and the expense of burial of this excessive number is 168,990*l.* per annum. Without taking into account the expenses of the corresponding excess of sickness, but reckoning only the excess of 168,990*l.* spent on funerals, we find that this sum raised annually would in thirty years liquidate the principal and interest, at 5 per cent., of a loan of 2,856,168*l.*, towards house-draining and the structural improvements and arrangements by which the excess might be prevented. To the charge of the excessive deaths must be added the charge of the births which take place to make up the ravages of mortality in the most depressed districts. The excess of births from this cause in London is estimated by Mr. Chadwick at 8000 a year. A sum of 50,000*l.* a year would be saved to the population of Liverpool (at the rate of expenses for funerals in London) were the burials in that town reduced to the same proportion as in the parish of Hackney; and such a sum would, in thirty years, pay off the interest and principal on a loan of 845,065*l.* sterling for structural arrangements. Mr. Chadwick, in effect, urges plans which would lead to a diminution in many instances of one-third of the deaths, and consequently of one-third in the number of burials; and then he shows that without diminishing in the slightest degree the solemnity of sepulture, the expense of the other two-thirds of the present average number of funerals could be reduced probably fifty per cent., the saving from both sources being greater than would remedy the annual share of the expense of the chief structural sanitary arrangements, supposing every house in an unhealthy district to be deficient. There would be "the amount saved by the reduction of the funeral expenditure, giving the health and longevity, and all the moral and social savings, *plus* the mere pecuniary saving; these remoter savings being in themselves unquestionably far greater than can be represented by the pecuniary items directly economised."

Mr. Chadwick's analysis of the class of persons in the metropolis engaged in the performance of services connected with the burial of the dead shows that, notwithstanding the immense aggregate expenditure, the business is not in a sound state. The number of persons whose sole business is that of undertakers, whose names are enumerated in the 'Post-Office Directory,' is 275; but it appears that the real service is performed chiefly by about sixty furnishing undertakers, who compete with each other in furnishing the supplies at a moderate rate to a multitude of inferior tradesmen, probably exceeding one thousand, amongst whom the excessive profits arising from extortionate charges are thus irregularly distributed. Many of the journeymen who form the superfluous retinue of attendants at a "respectable" funeral, place the insigna of undertakers in their window for the sake of the profits of one or two funerals a year. Some of the most respectable undertakers have eight or ten funerals a day, and some have two or three; but there are eight or nine undertakers waiting for the chance of every private funeral; and as the majority have a much smaller number than the minority, they are the more severely driven to charge their expenses on a small number of funerals. One man who called himself an undertaker, by reason of his being employed as "bearer" at funerals, and who, from accident or management, contrived to get into his hands the business of two or three funerals in a year, has been heard to say that he had got as much profit out of the funeral of an artizan as would provide him with a new suit of clothes.

The question of how the evils connected with the present system of interments are to be diminished, we must still reserve for another number.

Shepherds in New South Wales.—The duties of a shepherd in New South Wales are exceedingly simple. A flock usually consists of from four hundred to five hundred ewes, or from six hundred to a thousand dry sheep; three flocks being folded at one station. The shepherd is required to take his sheep from the fold in the morning, not later than an hour after sunrise, to keep sight of them on the pastures throughout the day, and to bring them back at sunset to the fold. They are then counted over and left in charge of the night watchman, whose duty it is to take care of the flocks in the folds until the morning, when each flock is again counted and delivered over to the shepherd. In the lambing season, on well-managed establishments, the ewes about to lamb are withdrawn from the flock and kept separate, under the care either of the watchman or of some other person appointed for the purpose, for a few days, until the lambs are strong enough to travel with the flock. At shearing time the flocks are brought in rotation to the home station to be washed and shorn. It is then the shepherd's business (unless he be also a shearer) to follow his sheep and take care that they are kept as free as possible from any kind of dirt, until the fleece is in a fit state to shear, which, in general, is the case about the third or fourth day after the washing. From this account of the ordinary duty of a shepherd in New South Wales, it will be seen that almost any one is capable of taking charge of a flock. Sheep are subject to very few diseases; and with the treatment of these either the master or the overseer will be conversant. In such cases the shepherd has only to follow diligently the directions he may receive from those under whose superintendence he is placed, and if possessed of common intelligence he will soon be capable of acting for himself. In fact a weaver or button-maker, after a few months' experience, will generally prove a better shepherd in New South Wales than the man who, having been brought up as a shepherd in England, may have acquired habits and prejudices exceedingly difficult to shake off, however unsuitable to the new position in which he is placed. In proof of this, it may be noticed that some of the best superintendents of sheep in the colony are natives of London, Manchester, or Birmingham, and that few professed English or Scotch shepherds are entrusted with the care even of a single flock. The duty of a watchman is as easy as that of a shepherd, he sleeps by the fold in a watch-box, trusting to his dogs to awaken him in case of the approach of a native dog or any other cause of alarm; he counts them in and out, and shifts the hurdles. Nor is the life of a shepherd at all irksome to those who have been accustomed to sedentary occupations. On the contrary, such persons have, in various instances, become strongly attached to it, which will not seem surprising when it is considered that it is a life of very great ease and freedom from care. Indeed, it is commonly remarked of the shepherds that they are more healthy and seem much more cheerful and contented than any other class of farm servants. The wages of a shepherd or watchman have been of late about 30*l.* a year, on an average, with from seven to ten pounds of meat, ten pounds of flour, two ounces of tea, and one pound of sugar, per week; or in the place of tea and sugar, milk. 20*l.* a year is, however, as much as, at the present low price of wool, can be given, with profit to the sheep-owner: and out of this sum a man of frugal habits may lay by a considerable sum yearly, more particularly should he learn to shear, by which he may put a few pounds into his pocket every summer, in addition to his wages; and still more so, should he, by care and good management, get charge of a breeding flock, and obtain a prize for rearing a large number of lambs. Again, if he be the father of a family, with two or three sons, from twelve to fifteen or seventeen years old, he may, after a short time, take charge of a station; the sons going out with the flocks, while he acts as watchman, in which capacity he will have many hours unoccupied during the day, which may be employed in improving his cottage and making his home comfortable. He may also cultivate a garden, or even a small field of corn, whilst his wife would find full employment in domestic matters, the rearing of poultry, &c.: and should their be daughters of sufficient age, they will be sure to obtain good situations as servants in respectable families.—*Hon. D. Dundas Murray's Summer at Port Philip.*



[Group from the Picture

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXIII.

Fra Bartolomeo (*concluded, from page 94.*)

About the year 1513, Bartolomeo obtained leave of the Superior of his convent to visit Rome. He had heard so much of the grand works on which Raphael and Michael Angelo were employed by Leo X., that he could no longer repress the wish to behold and judge with his own eyes these wonderful productions. He was also engaged to paint in the church of St Sylvester on Monte Cavallo: but the air of Rome did not agree with him. He indeed renewed his friendship with Raphael, and they spent many hours and days in each other's society; but Raphael had by this time so far outrun him in every kind of excellence, and what he saw around him in the Vatican and in the Sistine Chapel so far surpassed his previous conceptions, that admiration and astonishment seemed to swallow up the feeling of emulation. There was no envy in his gentle and pious mind, but he could not paint, he could not apply himself, a cloud fell upon his spirits, which was attributed partly to indisposition; and he returned to Florence, leaving at Rome only two unfinished pictures, figures of St. Peter and St. Paul, which Raphael undertook to finish for him, and, in the midst of his own great and multifarious works, found time to complete. It is said that while Raphael was painting on the head of St. Peter, two of his friends, who were cardinals, and not remarkable for the sanctity of their lives, stood conversing with him, and thought either to compliment him, or perhaps rouse him to contradiction, by criticising the work of Bartolomeo: one of them observed that the colouring was much *too red*. To which Raphael replied significantly, "May it please your Eminences, the holy apostle here represented is blushing in heaven, as he certainly would do were he now present, to behold the church he founded on earth governed by such as you!"

On returning to Florence, Fra Bartolomeo resumed his pencil, and showed that his journey to Rome had not been in vain. His finest works, the St. Mark, now in the Pitti Palace, and the famous Madonna di Misericordia at Lucca, were executed after his return. Every picture subsequently painted displayed increasing vigour, and he was still in the full possession of his powers when he was seized with a fever and dysentery, caused, it is said, by eating too many figs, and died in his convent, October 8, 1517, being then in his forty-eighth year.

The personal character of Fra Bartolomeo is impressed on all his works. He was deficient, as we have seen, in physical courage and energy; but, in his disposition, enthusiastic, devout, and affectionate. Tenderness and a soft regular beauty characterise his female heads: his saints have a mild and serious dignity. He is very seldom grand or sublime in conception, or energetic in movement and expression; the pervading sentiment in all his best pictures is *holiness*. He particularly excelled in the figures of boy-angels, which he introduced into most of his groups, sometimes playing on musical instruments, seated at the feet of the Virgin, or bearing a canopy over her head, but, however employed, always full of infantine grace and candour. He is also famed for the rich architecture he introduced into his pictures, and for the grand and flowing style of his draperies. It was his opinion that every object should be painted, if possible, from nature; and for the better

study and arrangement of the drapery, he invented those wooden figures with joints (called lay-figures) which are now to be found in the studio of every painter, and which have been of incalculable service in art.

His pictures are not commonly met with. Lucca, Florence, and Vienna possess the three finest.

The first of these, at Lucca, is perhaps the most important of all his works. It is called the Madonna della Misericordia, and represents the Virgin, a grand and beautiful figure, standing with outstretched arms, pleading for mercy for mankind; around her are groups of suppliants, who look up to her as she looks up to heaven, where, throned in judgment, is seen her divine Son. Wilkie, in one of his letters from Italy (1827), dwells upon the beauty of this noble picture, and says that it combines the merits of Raphael and Titian—of Rembrandt and Rubens! "Here," he says, "a monk in the retirement of his cloister, shut out from the taunts and the criticism of the world, seems to have anticipated in his early time all that his art could arrive at in its most advanced maturity; and this he has been able to do without the usual blandishments of the more recent periods, and with all the higher qualities peculiar to the age in which he lived."*

This is very high praise, particularly from such a man as Wilkie. The mere outline engraving in Rosini's 'Storia della Pittura' will show the beauty of the composition; and the testimony of Wilkie with regard to the magical colouring is sufficient.

The St. Mark in the Pitti Palace is a single figure, seated, and holding his Gospel in his hand. It is so remarkable for its grandeur and simplicity, as to have been frequently compared with the remains of Grecian art. For this picture a grand-duke of Tuscany (Ferdinand II.) paid 1200*l.*, nearly two hundred years ago, which, according to the present value of money, would be equal to about 3000*l.*

In the Imperial Gallery at Vienna is the Presentation in the Temple, a picture of wonderful dignity and beauty, and well known by the fine engravings which exist of it. The figures are rather less than life.

In the Louvre at Paris are two very fine pictures: a Madonna enthroned, with several figures, life-size, which was painted as an altar-piece for his own convent of St. Mark, and afterwards sent as a present to Francis I.; the other an Annunciation.

In the Grosvenor Gallery there is a divine little picture, in which the Infant Christ is represented reclining on the lap of the Virgin, and holding the cross which the young St. John, stretching forth his arms, appears anxious to take from him.

The Berlin gallery contains only one of his pictures; the Dresden gallery not one. His works are best studied in his native city of Florence, to which they are chiefly confined.

Fra Bartolomeo had several scholars, none of whom were distinguished except a nun of the monastery of St. Catherine, known as Suor Plautilla, who very successfully imitated his style, and has left some beautiful pictures.

THE TRIAL OF THE PIX.

Many of our readers may within the last few weeks have seen a notice in the public journals respecting the *trial of the pix*, a ceremony which is conducted under the authority of the Lord Chancellor and the Chancellor of the Exchequer, in relation to the coinage. As this ceremony takes place from time to time, and is of rather a curious character, we will briefly describe its origin and nature.

The *pix* is a box, chest, or casket, in which a number of new coins are deposited; and the *trial* of the pix is an examination into the weight and quality of the coins so deposited, with a view to the determination whether or not the coined money issued to the public is fair and equitable. The reason why this examination is made is, because the coinage is not actually made by the government, but by the authorities of the Mint, under a peculiar arrangement whereby the workmen are paid rather by what is termed 'piece-work,' than by the week or year; and the work so produced has to be tested by the government to see that it corresponds with the recognised standard. It is true that the examination is now in effect little more than mere form; but still the principle involved is an important one, and might be made more stringent if necessary.

The constitution of the Mint is such that each officer has a certain degree of responsibility from which he cannot be discharged; and on the occasion of a new coinage, this responsibility extends through an extraordinary number of persons, each of whom must have a kind of acknowledgment or quittance, stating that his portion of the duty has been properly rendered. The Master of the Mint, for instance, is bound to coin into sterling money the gold and silver bullion which shall be sent to him for that purpose under certain regulations; and rigorous precautions are taken to see that the coined money corresponds with the bullion from which it is coined; but as no human skill could ensure perfect accuracy in size and weight among numerous coins, the Master is allowed a 'remedy' or margin. Under the operation of this 'remedy of the Mint,' if the coins deviate from correctness only to a certain prescribed extent, the Master is considered to have performed his part, and receives his 'quietus' or quittance; but if this remedy or amount of error is exceeded, he must recoin the pieces at his own cost. The 'remedy' for gold coins has varied from one-third to one-sixteenth of a *carat*; that is, standard gold is supposed to be divided into twenty-four equal parts called *carats*, of which twenty-two must be pure gold and the rest alloy; and if the standard deviates from this more than (at present) one-sixteenth of a carat of pure gold in one pound weight troy of coins, the Master has exceeded his remedy. For silver coins the remedy is one pennyweight (either in fineness or in weight) in one pound weight. In proportion as the work becomes more accurate, the remedy is lessened, else it might be made a source of profit to the Mint at the expense of the country.

Without entering further upon the arrangements of the Mint, we will explain how the 'trial of the pix' is brought to bear upon the 'remedy' allowed to the Master of the Mint.

The first undoubted instance known of this ceremony in England occurred in the 32nd of Henry III., when the mayor and citizens of London were commanded to choose twelve discreet citizens and twelve skilful members of the Goldsmiths' Company. These twenty-four persons were to go before the Barons of the Exchequer, and having been sworn, were to examine the money of the realm, and see that it was made of good silver according to law; but it does not appear that this, like the 'trial of the pix,' was to exonerate the Master of the Mint, or to make him forfeit for any error, because old as well as new coins were examined. It seems rather to have been a general examination, with a view of ascertaining the actual condition of the coinage at a particular period. In the 18th of Edward III., however, the trial took place in a more exact manner, and for a purpose evidently analogous to that observable in modern times. The order of proceedings is laid down with curious

* 'Life of Sir David Wilkie,' vol. ii., p. 451.

minuteness:—"So soon as the moneys are coyned and compleate, the warden to receave yt as the Master receaveth it from the monyers" (the persons who conduct the mechanical operation of coining in the Mint are and have long been termed *moneyers*), "and putt yt in one chest shut with two keys. And before the moneys bee payd to the marchant, at the request of the said master, the warden shall make tryall of yt, and if yt shall not bee so good as yt is undertaken, yt shal bee retorned to the said Master to bee remolten" (coins were at that time made by casting, not, as at present, by stamping) "at his owne proper costs, and being afterwarde approved for good, the warden to take out of every C pound wet ij. starlinge, and of every five pound wet of gold one peece, which peece shall bee kepte in one chest with two keys, and sealed with two seales, th' one to remayne with the king's deputie, and the other with the master. The said box to be opened once every three months before the councell of the kinge, the warden, and the master, and the said moneys to bee assaid before them, and being found good and convenable, the said master to have letters pattents for his discharge; and being found otherwyse, the master to pay the kinge or his deputye that which shall apperteyne, and all the dowges and knowledgments shal bee kepte in the same chest. And the foresaid master shall never bee held nor challenged by any body, nor by the authority of the kinge, alwayes excepte th' assays of the money shall bee found defective."

In the subsequent reigns assays or trials were made at irregular periods. In the 8th of Edward IV., it was ordered that the warden, the changer, the assayer, and the comptroller of the Mint should at all times oversee the gold and silver coinage, and that, after the coinage had been examined and found good, and before it was delivered for circulation, these officers should take from every ten pounds weight of gold the value of a noble or more, and of every hundred pounds weight of silver two shillings or more, for the assays at Westminster, which were to be held every three months. Sir Richard Martyn, Warden of the Mint in the reign of Queen Elizabeth, drew up an account of the regulations accompanying every new coinage; in which, after speaking of the coining, he goes on to state:—"Before enie deliverance be maide of the holle somme, a portion of it, which remaneth to the quene, shal bee put in a boxe, whereof the assaye shal bee maede from time to time before such of the councell as the quene shall appoyntte, viz. of eurie vij. lb. weight of gold one peace at the lesst of euerie seuerall coyne of gold, and after that ratte of all the monies of gold: and of euerie journie of silver conteyning xxx. lb. wt. tooe peaces at the least of euerie seuerall coyne of silver, and so after that ratte of all the silver. And when the seid portions of gold and silver be taken and put into a boxe for to make the assaies as aforeseide, they shal bee enscaled with the seale of the seid warden and master, and the boxe shal bee shutt with ij. keies, the one shal bee towards the warden, the other to the master." The pieces thus deposited were afterwards to be tested by a ceremony analogous to the present 'trial of the pix.'

At different times in past ages the 'trial' has been held in the Court of Exchequer and in the Council Chamber. The persons, too, who have conducted or presided on this occasion have varied from time to time—the Members of the King's Council, the Barons of the Exchequer, a Committee of Lords and Commons, the Commissioners of the Great Seal, the Lords Commissioners of the Treasury,—all have, at different times, been the controlling authority.

The modern practice comprises two examinations into the weight and fineness of the coins produced. The first of these is called the *pixing*, and is carried on within the Mint, the object being to determine, for the security of the Master and superior officers, whether the moneyers have rightly conducted their part of the operations; while the other is the *trial of the pix*, before alluded to, carried on at Westminster, and intended to show whether the Mint, as an entire establishment represented by the Master, has conducted its operations fairly and equitably towards the country at large, as represented by the Government.

The gold and silver coins, after formation, are tied up in parcels called 'journeys,' or 'journey-weights,' a journey of gold weighing 15 lbs., and of silver 60 lbs. troy. But before being thus tied up, one pound in tale is taken promiscuously from each parcel, and weighed by the king's assay-master in a balance of exquisite accuracy. He declares the minus or plus upon each pound, which is recorded by himself and two other officers; and if this minus or plus exceeds the 'remedy' allowed to the moneyers, they have to recoin the money; or, even if the remedy be not exceeded on a whole pound troy, if there be doubt whether the coins be equal among themselves, a few are separately weighed by the comptroller as a test, and ordered to be recoined if beyond the remedy. Supposing the weight to be satisfactory, two pieces are taken from each of these pound weights of coins—the one for the king's assay-master to assay, in order to prove that the Company of Moneyers (who form a kind of sub-corporation within the Mint) have in no way deteriorated the quality of the silver or gold; while the other is sealed in a packet, put into the pix or box, and locked up with three keys, kept respectively in the hands of the Master, the Warden, and the Comptroller of the Mint, until the trial of the pix is to take place at Westminster. When the king's assay-master has proved the piece delivered to him to be of the right standard (which in this case is taken as the average of the whole journey-weight), he authorizes the money to be delivered to the owners of the bullion from which it has been coined. The money itself is locked up in the strong-room of the Mint while the assay on the selected pieces is being made.

Thus far the examination has been merely the *pixing*, carried on by the officers of the Mint for their own security. The *trial of the pix* takes place afterwards. This trial, according to Mr. Ruding, is conducted as follows:—

Upon a memorial being presented by the Master of the Mint, praying that the trial shall take place, the question is brought by the Chancellor of the Exchequer before the sovereign in council; and a summons is then issued to certain members of the Privy Council, to meet at one of the government-offices in the forenoon of a certain day. A precept is likewise directed by the Lord Chancellor to the wardens of the Goldsmiths' Company, requiring them to nominate and set down the names of a competent number of sufficient and able freemen of their company, skilful to determine and describe the defects of the coins (if any should be found), to form a jury to meet the privy-councillors. The number of these selected goldsmiths is usually twenty-five, of whom the assay-master of the Company is always one.

When the court is formed, the clerk of the Goldsmiths' Company returns the precept, together with the list of names; the names are called over, and twelve persons are sworn. The President of the Court then gives his charge to the jury. Formerly this charge was so worded that the jury was required to examine "by fire, by water, by touch, or by weight, or by all or by some of them, in the most just manner,

whether the moneys were made according to the indenture and standard trial-pieces, and within the remedy;" but in later times the charge has probably varied somewhat according to the person who filled the office of president. When the charge is concluded, the pix containing the coins is delivered to the jury, and the court adjourns.

The jury retire to a room appointed for that purpose, and are provided with the pix, the weights of the Exchequer and of the Mint, and a balance of great sensibility. We do not know whether any changes have recently been made in the balance used on these occasions; but some years back the balance employed would turn with six grains, when each scale was loaded with 48 lbs. 8 oz. The jury being seated, the foreman reads the indenture or warrant under which the Master of the Mint has acted, stating the conditions under which he was to be considered as having fulfilled his office. The pix is then opened, and the packets of money taken out. Each packet contains coins from the 'journeys,' or parcels of coined gold or silver, and is sealed by the Warden, Master, and Comptroller of the Mint. When the seals of each packet are broken, the foreman of the jury reads the indorsement, and the packet is examined, to see whether the contents agree with the indorsement.

When all the packets are opened and found to be right, the moneys contained in them are mixed together in wooden bowls, and afterwards weighed, and the weight registered. The indenture under which the Master has acted specifies that he is to make coin agreeing with certain 'trial-pieces' as to fineness or standard; and the jury therefore examine how far this has been carried out. A sufficient quantity is cut from one of the trial pieces; and by melting and the various processes of assaying, the jury determine whether there is the same proportion of fine gold or fine silver to alloy in the new coins as in the trial-pieces. The assaying is very carefully made, and the results are as carefully registered.

When the examination is finished, the jury return their verdict, wherein they state the manner in which the coins have been found to vary from the weight and fineness required by the indenture, and whether and how much the variations exceed or fall short of the 'remedies' which are allowed; and according to the terms of the verdict the Master's quietus is either granted or withheld.

For example, at a trial of the pix at which Mr. Ruding was present, the gold coins in the pix-box amounted by tale to 891*l.* 13*s.* 6*d*, and by weight to 190 lb. 9 oz. 8 dwt. According to the proportions mentioned in the Master's indenture, the coins in question ought to have weighed 190 lb. 9 oz. 9 dwt. 15 gr.; so that they were deficient 1 dwt. 15 gr.; but the remedy on 190 lb. 9 oz. 9 dwt. 15 gr. was 1 lb. 3 oz. 18 dwt., so that they were far within the remedy, and the result was deemed satisfactory. One pound weight of the gold coins was then assayed, and compared with the standard of the trial-pieces; and the result was in this case likewise satisfactory.

In a trial of the pix in 1818 the gold coins accumulated in the pix-box amounted to 8070*l.* 10*s.*

Economy of Fuel.—In the colder weather of the present winter (1843), the required degree of temperature and ventilation at the Model Prison at Pentonville was maintained at a cost of less than one half penny per cell for twenty-four hours, although the cost of fuel was at London prices.—*Parliamentary Report.*

RAILWAY RAMBLES.

OLF, SURREY.



S spring approaches, we are reminded that it is time to recommence our rambles; and in doing so we intend not to confine ourselves so strictly as heretofore to the limit of a day's journey. At present, however, we shall not increase their length very considerably; nor go far from home for our subjects. There is so much that is beautiful in our home counties, that we shall find sufficient to reward us yet awhile, even if we do not leave them. True, there are no

> "Mountains, on whose barren breast
> The lab'ring clouds do often rest."

nor mountain-torrents, nor rushing waterfalls, nor many other mighty things; but there are

> "Russet lawns and fallows gray,
> Where the nibbling flocks do stray;
> Meadows trim, with daisies pied,
> Shallow brooks, and rivers wide."

to say nothing of our woodland scenes, with their "shadows brown that Sylvan loves." In a word, there are most of the amenities, if there be few of the sublimities of nature. And then there are the places, some of which we have already visited, where our great men, "better none," have dwelt, or by the power of their genius rendered memorable. We love all such associations, and although our limits will only allow us to glance at them, we shall not intentionally pass any by unnoticed.

It has been often remarked that the various picturesque features of a country are seen to most advantage in their diversified combinations by following the windings of some of its principal rivers; and there is much truth in the observation, especially if the higher grounds on either side of the river be occasionally ascended. Indeed, the remark may be taken in a more general sense, for it is almost equally true of the economic features of a district; the more important towns and villages being ordinarily situated along the banks or in the near vicinity of a river: so that, if it be not too literally observed, it would hardly be too much to consider that a fair knowledge of the leading characteristics of a district may be readiest obtained in some such manner.

Let us now take a fine spring morning, and see whether we cannot find in a ramble down the Mole enough to repay us for the time we devote to it: not that we intend, however, to tie ourselves strictly to its banks;

> "we 'll loosely wear the chain
> That binds us, pleasant river, to thy side."

Surrey is not famous for its rivers: the Mole and the Wey, which are the principal, both have their source in other counties. The Mole rises in Sussex, but is of little importance till it enters Surrey. It has been said to derive its name from its burrowing propensities; but of these we shall speak when we reach

the spot where it has been said to dig its way: it more likely received its name from its extremely tortuous course, which may have been thought to bear some resemblance to that of a mole. It is no dashing stream, like those of the mountain districts; it is rather quiet, sober, and contemplative: it has been called "sullen" and "silent" by the poets—for poets have sung of it; indeed, we are about to make the acquaintance of no commonplace river, but one that has been honoured by the muse of Milton, Drayton, Pope, Thomson, and many of lesser fame; mentioned by grave writers, and altogether is of name in the world; though it must be admitted that its fame has been acquired—as happens sometimes with men as well as rivers—by the supposed possession of qualities that do not belong to it. Yet whether deserved or not, its fame has given it a standing that makes all who approach it do so with an unusual degree of respect. Even Manning, in his huge 'History of Surrey,' ventures a little beyond his usual style when he comes to speak of its source. "It is almost as difficult," he tells us, "to say which is the head of the Mole, as it is of the Nile." We shall not attempt to solve this difficulty, but content ourselves with saying that the Mole is formed by the union of several small streams that rise on the borders of Sussex. The main branch appears to be that which has its source at Rusper, about two miles from Horsham Common, and enters Surrey at Charlwood, a little below which it is joined by another stream that rises in Tilgate Forest, Sussex. But although the Mole has its source in Sussex, it is a most insignificant stream for some distance after it has left that county. It belongs to Surrey, and, with the exception of the Wey (to which and to its associations we hope soon to introduce our readers), is the only river of importance it contains.

There is little in the first few miles of its course that is remarkable: at Horley it turns a mill and begins to look a little like a river: Horley church, past which it flows, like many of the Surrey churches, is an interesting building. A mile or two farther on it is joined by another stream from Worth in Sussex, and soon after by a very beautiful one which issues from the foot of the hill near Merstham church in Surrey. Thus strengthened, it leaves the clean dull town of Reigate on the north, and pursues its wild way towards the Thames. The rambler who may be tempted to follow its windings, may conveniently join it either at Reigate or at Horley; there being a station at each of these places on the Brighton railway. At Reigate there is also a station belonging to the South-eastern Railway, which turns off at that place to Dover. There is little in Reigate to detain the casual visitor—of its castle nothing now remains; the Baron's Cave, as it is called, may indeed be just worth looking into; and there is a pretty park. The town has that listless look so common now in towns that depended much on posting and coach traffic, and which have been destroyed by the proximity of a railway. Those who knew it a dozen years ago will be glad to escape from the melancholy its present dullness generates.

Let us then bend our steps down again to our river; and we need not fear but the cheerful aspect of those broad meadows, the clear waters reflecting so gaily the bright glance of the sun, and the glad notes of the skylarks, will effectually dissipate any obtrusive thoughts. There is a quiet cheerful look about the place we have now reached—a sort of Cuyp-like quiet—that is very pleasant. The banks of the river are low, and farm-houses and cottages, with a few tenements of a somewhat more ambitious character, are distributed about the valley, or formed into little straggling hamlets, each with its rustic church and lofty trees, while here and there a water-mill gives an appearance of life to the whole, and by its sound affords an agreeable relief to the ear. Following our river, we soon arrive at Leigh, where is a farm-house known as Swain's, in which there is a tradition that Ben Jonson once resided; and a room is still called his study. The Mole is apt in winter to overflow these parts, and at such times the fords, of which there are several, are impassable. Posts are fixed at some of them, marked



[Pet Worth Castle.]

with a scale of feet, by the height of the water up which the traveller is guided. Perhaps some of our readers are acquainted with Bewick's engravings; if they have seen them, they will not have forgotten the 'tail-pieces' with which he has so plentifully adorned his works on natural history—little bits of scenery, rustic adventures, scraps of all sorts illustrative of rural life: to those who know them, we can give no better idea of the character of the country in this neighbourhood, than that it reminds one, at every half-dozen steps, of some of them.

Wonum (or Wouham), along whose grounds our river runs, presents some charming diversities of scene; indeed we here perhaps for the first time catch a fair view of the Mole's real character. The park has some fine trees, and the house is an important object. But with a passing glance at these, and at Moor Place, which looks as if it deserved a closer inspection, we proceed, for much lies before us. There is a fine aristocratic appearance about Brockham, the next place we need notice; and the park has many of those features that make English park-scenery always so interesting. But if we intend to keep beside our stream, it must be at a venture, for see! here is a ditch both broad and deep to be got over, and there a notice —"Whoever trespasses in these woods will be prosecuted." Let the rambler choose his own way; whether through the wood and across the fields, or around and by the road, either is pleasant; and either will bring us out by Brockham-green, where the prudent pedestrian will do well to avail himself of the hospitality of the civil landlady of the Royal Oak, who will presently dress him something such as it is hard if he has not gained an appetite to relish, and give him "some barley wine," as old Izaak Walton has it, "the good liquor our honest forefathers did use to drink of; the drink which preserved their health, and made them live so long, and do so many good deeds."

We must not stay long though. Betchworth Park is before us, and a stroll through that would repay our journey. The Mole is now a river of respectable size, and exceedingly picturesque. In the park is a large number of stately trees, oaks, elms, walnuts, and beeches; the river runs through it, and Box Hill towers on our right. Betchworth Park is, we think, in many respects the most beautiful of any within a like distance from London. Soon after we enter it from Brockham we see before us the ruins of Betchworth Castle, as shown in the preceding page. They are raised some height above the river, on a mound whose side is covered with a young plantation. The ruins are picturesque, and the grey walls, contrasted with the rich tone of the ivy that has crept over a good part of them, stand out finely against the deep blue sky. But those who associate with the phrase "ruined castle," the idea of such fabrics as may be found in our border counties, will be disappointed here. Betchworth Castle is really a mansion, not at all warlike in its appearance, that has apparently fallen into ruin as much through neglect as time and violence; and there is little in its history that is more exciting than may be found in the records of the transfers of estates as families decay or tastes change. Yet, as there are not many ruins in Surrey, this is not to be despised; every care appears to be taken by its present proprietors to prolong its existence.

The Mole in its course through the park is half concealed in many places by the dense foliage on its banks, chiefly of a profusion of alders with fantastic roots and curiously intertwisted branches, while it is further diversified with an abundance of little islets, miniatures of the aits so familiar on the Thames. There is many a spot along here that is perfectly tantalizing to the angler who cannot stay to cast a line. What fine carp must lie under those old roots! what chub too may! and we happen to know that both here and in the mill-pond just outside the boundary of the park they used to be in plenty, and not small either. Hofland, in his 'Angler's Manual,' says the Mole is too slow a river to furnish trout; we think he might have found a few hereabouts; and at Leatherhead some as fine as ever turned up a side in his favourite Hampshire Stour or Ullswater Lake.

In our initial letter we have given a scrap of scenery from Betchworth Park.

[To be continued.]

LATE HOURS OF BUSINESS IN DRAPERS' SHOPS.

SOME time ago an Association of Assistant-Drapers in London offered a prize of twenty guineas for the best Essay on the nature and extent of the "Evils which are produced by late Hours of Business, and on the Benefits which would attend their abridgment." About fifty essays were submitted to competent adjudicators, and several of them were deemed highly meritorious; but the prize was awarded to the one written by Mr. Thomas Davies, who was himself but recently an assistant-draper. The Hon. and Rev. Baptist Noel, in a preface to the essay, which has been published, justly remarks, "That a young man who, until a recent period, had to endure all the disadvantages arising from such an employment, should have produced a work the general style of which would do credit to an author of liberal education and of some experience in writing, pleads eloquently with every generous mind, that the class to which he once belonged should not be debarred from the opportunities of self-improvement which mechanics, and even field-labourers, can command." A perusal of Mr. Davies's essay satisfies us that the praise which Mr. Baptist Noel has awarded to it is no more than it deserved: it *is* a remarkable specimen of good style and just thoughts from one not professedly literary.

The facts which Mr. Davies details are briefly these —"The young men who serve in the shops are engaged in business variously from the hours of six, seven, or eight o'clock in the morning, to nine, ten, eleven, or twelve o'clock in the evening; these variations being according to the season, the character of the shop, and the custom of the neighbourhood. That is, they are occupied for a longer time each day in the summer than in the winter, in all shops; while those shops which are frequented chiefly by the middle or working classes are kept open later than those which are frequented by the upper classes. A further difference also exists according to the kind of street in which the shop may be situated. Thus in busy thoroughfares they are generally kept open later than in more retired streets. The best shops in the best neighbourhoods are generally opened at seven o'clock in the morning (in some few cases at six o'clock), at which hour a certain number of the young men come down to make preparations for business in their several departments. At eight o'clock (or in some cases at half-past seven) the others, who may be called the seniors, come down, when the former party are allowed to retire for half an hour for the purpose of dressing. After their reappearance there is no further release from the engagements of the shop (excepting for those wonderfully short periods of time in which assistant-drapers manage to consume the necessary quantity of food at meals*),

* Mr. Davies observes, that "while the mechanic or day-labourer has half an hour allowed him for breakfast, and an hour for dinner, out of his twelve hours of labour, the assistant-draper has no fixed time allowed for either. Five or ten minutes

until the whole business of the day is over; and every article, from a piece of silk to a roll of riband or a paper of pins, has been carefully put into its appointed place. Sometimes, when, owing to the weather or some other cause, there have been but few customers during the day, this re-arrangement is completed by the time of shutting the shop, which in the present case is from eight o'clock to nine in the winter, and from nine to ten in the summer. But on busy days, and during nearly the whole of the spring and former part of the summer, it is often found to be impossible to leave the shop within one, two, or three hours after it has been closed. So that during a large part of the year it is a common thing for these young men to be pent up in the shop from six or seven o'clock in the morning until ten or eleven at night. This is a description of the present mode of carrying on business, as it appears in the most favourable aspect. The far larger number of shops, which are frequented chiefly by the middle and working classes, are kept open until nine or ten o'clock in the winter, and ten or eleven in the summer. So that it frequently happens that the young men are employed from seven o'clock in the morning until twelve at night; that is, for a period of seventeen hours out of the twenty-four! On Saturdays the time for closing (as if in mockery of a 'preparation for the Sabbath') is in all cases later. In many shops the young men are often unable to retire to rest until one or two o'clock in the Sunday morning."

During these long hours of business it would be considered an unpardonable offence in any young man either to sit down or take up a book, should he happen to be unoccupied for a few minutes. He spends the long day in a vitiated atmosphere, which at night is still more deteriorated by the gas-lights, "all day on the move, yet never in exercise; always engaged in what wearies the body, but never in that which invigorates." Nor should it be forgotten that the assistant-draper is exposed to considerable anxiety. He has not only to show his customers the articles which they demand, but is expected to make them buy. "In some cases, it is at the peril of losing his situation that he fails to persuade the customer to buy; in nearly all cases, the frequent repetition of such failures is sure to produce such a catastrophe." At ten at night, perhaps the assistant-draper escapes from the pernicious atmosphere which he has breathed for so many hours, and for the first time in the day feels that his lot has some alleviations; but the sunshine no longer diffuses its genial warmth and cheerfulness; the houses of friends are closed at such an hour, and he is therefore excluded from cultivated and virtuous society; and it is too late to attend scientific or literary institutions, even were the mind not sufficiently wearied with the labours of the day. It appears that out of seven hundred members of the London Mechanics' Institute there is only one draper; and Mr. Davies shows that this class have no opportunity of acquiring knowledge "beyond that superficial information which may be obtained by sleepy glances at the newspaper:" and again, he remarks, that "they who have the strongest taste for literature have recourse only to the lighter kinds; and even while thus engaged, they often fall asleep with the book in their hands." A weakening of the mental faculties, and contracted and prejudiced minds, are the result of this deprivation of opportunities of acquiring knowledge, and exercising the intellectual faculties. The consequences to health of such a life are obvious; and the moral evils are not less painful to contemplate. "Forbidden all relaxation and amusement, denied all aliment for their minds, and separated from whatever is endeared to their hearts, many sink into a dejection which the knowledge that they may at any moment be discharged, if the sales which they effect do not satisfy their employers, confirms and deepens. Of course in the absence of reading, of intellectual conversation, and of all other instruction, their faculties wither away; while a desperate longing to throw off the eternal yoke of unvarying, unmitigated, profitless, and thankless toil—a passionate thirst for *some* enjoyment—for which no friendships, no good society, no wholesome amusement, no holidays, no change of scene, no affectionate intercourse with any living beings, no prospect of a home (for few shops will employ married men), affords any alleviation, hurry numbers, against interest and against conscience, in the face of ulterior mischiefs which glare upon them like spectres from the obscure future, to plunge into the haunts of vice, and to put on its manacles."*

We are told that in this business, in London, it is customary to discharge an assistant without an instant's warning. A trade in which those employed are so little protected against the passion or caprice of the employers is certainly not in a sound state. While the competition for business is no doubt excessive amongst the master-drapers, the struggle to obtain employment is still more so amongst their assistants. So many are seduced by inexperience into the belief that within the glittering shops which meet the gaze in all the great thoroughfares of the metropolis all is as fair as the outside view; and so many youths in remote country towns dream of London as a very haven of delight, and are discontented until they reach this goal of their hopes. Now, would it not be better that a large proportion of these young men, instead of committing themselves to a life such as Mr. Davies has described, should endeavour to seek a bolder sphere for their enterprise in our colonial possessions? There they might assume the dignity of men; and the exercise of their energies of itself would be a source of happiness, while by perseverance and industry they would at the same time be acquiring property and independence in healthful pursuits. Something may, however, still be done by moral means, and also on economical grounds, to improve the condition of the draper's assistants. Public opinion is gradually becoming more conscientious in its action; and when once an abuse is dragged into the light of day, some mitigation of its evils cannot well be avoided. Persons of strictly Christian principles will feel that they are doing an injustice to their fellow-creatures by resorting to shops at late hours, and giving their countenance to a system which is productive of so much evil; and they will not fail to give the preference to those establishments which attempt, perhaps at some loss in the first instance, to allow to those in their employment advantages which are not denied to many classes of a more humble station. Such considerate employers would be sought after by the best assistants, and they would be able to make their choice from the best-conducted young men in the trade. This is one of the economical advantages which would attend an alteration of the present hours; but other general advantages of abridging the present intolerable length of the hours of business would be felt by the employers, as well as by their assistants. First, as to the assistants themselves:—"Short hours would materially tend to secure to them health, cheerfulness, long life, and knowledge. In some cases they would strengthen the

is the usual time spent at breakfast or tea; and dinner is hurriedly snatched as it can be during some momentary intermission of business. The idea of perfect mastication, or of sitting a little while after meals, would be regarded as preposterous. We may safely assert that, in nineteen shops out of twenty, the average time spent at the three meals, breakfast, dinner, and tea, is not more than half an hour."

* Preface to Mr. Davies's Essay, by the Hon. and Rev Baptist Noel.

habits of religion and morality; in all they would destroy some of the most powerful inducements to vice and to ungodliness. The assertion, that they would be more vicious if they were earlier dismissed from their duties, is equally contrary to theory and to fact. Now a forced ignorance tempts them to vice, and they seek vicious gratifications as the only ones within their reach; but then they would have access to instruction: at present they are impelled to intemperance, because they feel exhausted and depressed; then they would retain the vigour of mind and body which would lessen the craving for such stimulants. The shopkeeper, in giving the evening to his young men, would save it for himself; and thus, securing the opportunities of mental culture, and of repose in the bosom of his family from the toils of money-making, would be a wiser and a happier man. His assistants, more healthy, cheerful, and zealous, would work better for him during the day; he would save his gas at night, and, to compensate for the loss of a few nocturnal customers, he would probably gain some better day-light ones." Next, as to the public:—"Almost all purchases may be made more safely by daylight, when the texture of the goods can be examined and the colours more distinctly seen. Few respectable families would refuse their servants time during the day to purchase what they need. It is better for mothers in the working classes to be at home with their husbands in the evening than to reserve those hours for shopping. And, of all the persons concerned, milliners and dressmakers should most desire the change; because, while others work late, their destructive labours will go unmitigated; but if all other classes are dismissed at an earlier hour, public feeling will not long suffer them to be worn out in early youth by protracted toil."*

We learn from the last Report of the Metropolitan Drapers' Association that in London the "evening trade has materially decreased:" many of the most respectable houses now close their establishments at seven o'clock in the evening, though this improvement is still unhappily far from being general. In most of the large towns similar efforts have been made to obtain a diminution of the long hours of business. We may add, that in London, in particular, this movement has been characterised by a high moral tone, and that neither clamour nor intimidation have been used. A great social benefit is desired, and it has been sought for by the only means in which such benefits are to be obtained.

Anecdotes of a Robin Redbreast.—The following anecdotes have been sent to us by a clergyman, who vouches for the correctness of every one of them:—"The bird referred to passed a great part of five winters in my parlour, and had entered upon the sixth when he disappeared, having most probably fallen a prey to his merciless enemy the cat, from whose clutches, notwithstanding his fine eye and vigilant habits, it was wonderful he escaped so long. The first winter during which Robin took shelter under my roof proved a severe one, and afforded me an opportunity of becoming pretty well acquainted with my new guest. He soon came to know who kept the key of the pantry, and whenever that key was turned he was on the alert, and hopped in fearlessly to receive from the mistress of the family some cheese-crums, of which he was particularly fond. He very early became acquainted with the entrance to the kitchen, and the stair which connected it with the parlour; and if a fine day occurred, he seldom failed to go out, but always returned before night. His favourite place of rest was the fold of a festooned window-curtain, which for his accommodation was never dropped, and in which I had a little basket placed, in which he took great delight, and always occupied it in the night time. From the attention which I paid to him, he became very familiar with me, and seemed to enjoy getting as near to me as possible, insomuch that he was frequently perched upon the corner of a pastable desk which I used when writing, and gave me a sweet song in requital for my kindness. All these proofs of domestication other robins may perhaps have exhibited, but I am going to mention some circumstances respecting him which I apprehend are not so common. When spring returned, he dispensed with the shelter which my house afforded him during the winter, and set out, like Cœlebs, in search of a wife. This comfort he was not long in finding, and his first care seemed to be to introduce her to my notice. When I went into the garden, he showed that he had no wish to drop my acquaintance, but rather to render it subservient to the alleviation of some of his domestic cares. He came close to my foot, and when I held out my hand he alighted upon it, expecting to find the cheese-crums with which I was wont to feed him. I took the hint, provided a small box, which I replenished from time to time with such food as I knew he liked, and to which Robin, coming from the most distant part of the garden or adjoining plantation, when he saw me, applied with the most perfect confidence. I have said that he wished to introduce his chosen mate to my notice. He brought her as near to me as possible, but Robina, a name given to her by a friend of mine, never conquered her fears so far as to alight on my hand. She frequently, however, sat on a tree or bush hard by, and was fed by Robin, who carried crums to her out of my little box. It appears that the females of these birds choose the situation of the nest, for some seasons it was at so great a distance from my habitation, that a long time elapsed before we discovered the place. Robin, however, had no desire to conceal it from us, and seemed as much delighted to feed his young as he had been to feed his mate from my hand; and when the young were fledged and left the nest, he brought them nearer and nearer to my dwelling, as they were able to extend their flights, that he might avail himself more fully of my bounty in supplying them with the means of feeding them. I may mention here, that his nest having one season been close upon the river, a terrier which happened to follow me so frightened the brood at the moment they had essayed to fly, that they got entangled among long grass, and one of them fluttered into the river, and was with some difficulty saved by me from drowning. The distress and anxiety shown by the parent bird upon this occasion was very striking, but the most remarkable part of the story remains still to be told. Happening to pass that way some days after, accompanied by the same dog, he met me at a little distance from the place where his young were, and, perching on the branch of a tree exactly opposite to my face, he screeched and showed signs of distress, the language of which was as plain as if he could have articulated it, 'Why have you allowed this dog to come here again to put my progeny in jeopardy?' This anxiety and distress was equally great upon another occasion, when, having brought his young to be fed from a window, one of them got between the sashes when drawn up, and was not without difficulty relieved from its perilous situation. Such, however, was his reliance on our good offices, that he never resented such occurrences, but placed them entirely to the chapter of accidents. I remember one morning that having gone out in my night-cap, which was not my custom, Robin kept at some distance, not satisfied about my identity: he hesitated, but ventured nearer and nearer till, his doubts being removed, he alighted on my shoulder. There was one summer in which Robina had chosen her nest at a distance unusually great from my house, for I never saw my little favourite during the whole course of it; month after month passed away, and I gave him up for lost. Walking in my garden one day, accompanied by a friend, I observed a robin, and said, 'If my robin were alive, I should say that is he.' Accordingly, I no sooner stopped and extended my hand than he alighted upon it. This happened exactly seven months from the time I had last seen him, and afforded a most astonishing proof of memory in so small an organized being. This faculty, however, was not displayed in a solitary instance, but was conspicuous at the commencement of every succeeding winter. His way to the parlour was familiar to him, and as soon as he entered it, all his old haunts and habits were resumed, and he retreated to his little basket in the window-curtain at night, just as if he had been but one day in place of seven or eight months absent. I shall only add that on different occasions when about to leave home, Robin has perched on the arm of the gig, as if to request permission to be of the party. When he made his appearance at the commencement of the sixth winter, his welcome was of the most cordial kind, and his loss proportionally regretted."—*Philornis.*

* Preface, by the Hon. and Rev. Baptist Noel.



[Auction Mart.]

AUCTIONS IN LONDON.—No. II.

The numerous divisions into which the general business of Selling by Auction has separated in the metropolis, afford noticeable illustration of extraordinary magnitude. The connoisseur in pictures and prints, goes his rounds regularly through one series of rooms, where little else ever meets his eyes; the book-collector has his special haunts where the diffusion of knowledge through the agency of folio, quarto, octavo, and duodecimo is alone cared for; the book-publisher has not unfrequently his private 'Trade Sale,' where, after an excellent dinner given to them at some first-rate hotel, the booksellers discuss, over their wine and dessert, the commercial merit of the last new volume of poems, fiction, or history; furniture occupies the principal attention of a third class of auctioneers, carriages and horses of a fourth; whilst, greatest of all, there are some—the mighty ones of the calling—who hardly condescend to guide any less important property than estates, leasehold, copyhold, or freehold, through all the eventful stages of 'Going,' 'Going,' 'Going,' to the final 'Gone,' so expressively signified by the abrupt conclusive tap of the potent hammer.

Another and still more striking, because more palpable evidence of the greatness of our metropolitan auctions, presents an exactly opposite characteristic: at 'Garraway's,' and at the 'Mart,' Bartholomew Lane, the two most famous auction-places in London, it is the *concentration* of business that arrests the stranger's attention, he is astonished there at the immense number, amount, and variety of sales of property of all kinds that take place in them. Let us avail ourselves of a brief glance at the two. And first we will step into Change Alley, dark, narrow, and full of short turnings, lined on each side with dingy-looking shops or dungeon offices, but not the less a region of thorough romance, if indeed the realities enacted here did not surpass the wildest dreams of man's imagination; this alley was what we may call the local home of the great South-Sea Bubble. And a terrible picture of it is preserved to us in Swift's writings, where, likening the alley itself to a gulf in those very seas from whence such unsummed treasures were to be obtained, he says—

> "Subscribers here by thousands float,
> And jostle one another down;
> Each paddling in his leaky boat,
> And here they fish for gold, and drown
>
> Now buried in the depths below,
> Now mounted up to heaven again,
> They reel and stagger to and fro,
> At their wit's end, like drunken men.
>
> Meantime, secure on *Garraway* cliffs,
> A savage race, by shipwrecks fed,
> Lie waiting for the foundered skiffs,
> And strip the bodies of the dead."

The alley has experienced little outward change since the period here referred to; the old shops have here and there put on new faces, but the thoroughfare is as narrow as ever; Garraway's still flourishes in a kind of immortal youth, though distinguished by more legitimately commercial objects than that of accommodating lookers-on, while, in typical language, they "strip the bodies of the dead;" it is now, with one exception (the Mart), the place where the greatest number of important metropolitan sales occur. The sale-rooms on the upper floor of the building present nothing remarkable, but the coffee-room below has a most primitive and peculiar aspect. Not all the windows of the extensive range that surrounds the greater part of the long, low, broad room, serve to do more than just give sufficient light to the preparer of the dainty sandwiches, or to the enjoyers of the same, who are walking about plate in hand, or standing opposite the immense fire, with its pairs of Titan-like coffee-pots, resting on a kind of battlement in front. And be it observed, they are proud here of the reputation

of Garraway's, and fully conscious of the responsibilities that reputation has conferred on the successors of the illustrious founder, even in the humble matter of sandwiches, than which nothing can be better, unless it be indeed the glass of porter that should always accompany them.

The Auction Mart is a very different looking place. Of its exterior we need not speak, since the cut describes it sufficiently. On entering, we find ourselves in a handsome and large saloon, with a noble staircase ascending in front from the farther end, offices on either side partially covered with printed bills of sales by auction, houses to let, and similar matters, and above which appear curious little dark galleries, to which we ascend by doors just within the entrance. These doors and galleries are connected with sundry small offices, occupied mostly by solicitors and brokers, although originally intended for auctioneers. But that was an idea belonging to the palmy time of the Auction Mart, when it was calculated that great profits would accrue to the proprietors from the erection of the building. This took place in 1808, and for a time the most sanguine anticipations were exceeded; on the 26th of December, 1809, a single 50*l.* share was worth 165*l.* 10*s.*; now the same is worth about 25*l.*, and the price has been as low as 17*l.* This unfortunate result, however, appears to have been mainly owing to an unnecessary expenditure; the building alone, independent of fittings up, furniture, &c., cost 42,000*l.*, or as much, we understand, as the neighbouring Mansion-house. Then these fittings up were, in some respects at least, on an absurdly extravagant scale; a part of the wall at the top of the great staircase, forming a long horizontal strip of windows, was filled up by three pieces of plate-glass, costing each about 60*l.*; and which were afterwards broken by some accident—a slight settlement of the wall, we believe. The joint-stock now comprises one thousand and eighty shares of 50*l.* each, two hundred of which are in the possession of the trustees of the building, to provide for repairs and similar contingencies. The directors are among the most eminent of the London auctioneers.

Even as we pause in the hall to look around us, the systematic arrangements for the management of the business of the mart, that meet the eye, convey a forcible impression of the extent of that business. First, there are tables of general information, where, for instance, we learn if any property recently advertised for sale by auction has been previously disposed of by private contract, or if any announced sales have been postponed or countermanded. Next the eye falls upon the tables that show us the sales of to-day, and in what part of the building they will be carried on. Lastly, in the centre, raised on high, is a small six-sided frame, each side headed with the name of one of the days of the week; consequently, if you want to see what sales occur on the next Friday, you look at the "Friday" side. But that is not all. Each side is divided again horizontally into seven portions, marked A, B, C, &c., referring to the seven principal rooms of the Mart, in which auctions take place; so that we see at once not only on what days of the week, but also in what rooms sales will take place. Thus, next Friday, we perceive one gentleman is going to sell various leasehold estates in the room B, upper floor; another, pictures and effects in the neighbouring room D; a third, pinks, piccotees, and carnations in the room C, on the first or principal floor. The arrangements preliminary to this announcement are very simple. The auctioneer goes to the secretary, is shown the book for the ensuing week, constructed on a similar principle to the frame above described, turns to the page which refers to the day he has selected, and there chooses the room he likes best of those not already engaged, and writes his name in the compartment set apart to such room. Before we ascend the staircase, there are one or two other features of the ground floor demanding notice. The side doors leading upward to the quaint-looking galleries already mentioned lead also downwards to an humble coffee-room, a kind of tap in the basement, and where, if you grope about long enough, you will find sundry offices and a poulterer's shop in full business, though without the aid of candles it would evidently be impossible to tell flesh from fowl in such a place in the lightest day. But the more extraordinary part of the business is that these cellar-offices should have been so much in request during the temporary flush of the Mart's prosperity as to let for sums that we feel reluctant to mention, though obtained from excellent authority; we have been informed that they were let, at the period in question, at rents of 70*l.* and 80*l.* a-year each! The coffee-room proper is entered by a door in the saloon under the great staircase, and forms a large room where refreshments of all kinds are provided for the use of the visitors to the mart, including of course all persons that think proper to come. As we ascend the staircase, an inscription in the window informs us that "The sales commence immediately on ringing the bell." The rooms are admirably adapted for their purpose, and at once handsomely and conveniently fitted up. A series of low mahogany tables with benches extends through the centre of the room, and up to (at one end) the enclosed and raised space like a judge's bench, which forms the auctioneer's sacred domain, and in the middle of which, raised on high, stand his chair and desk. Everything indeed wears such a comfortable aspect, that one could fancy the days of Queen Anne had returned again; we look round almost expecting to see some dowager enter with a lap-dog under her arm, or some mincing beau with his "clouded cane." The picture-rooms are on the upper story, and admirably lighted from above. With so many advantages, direct and indirect, attending sales in the Mart, it is not to be wondered at that nearly all the most eminent auctioneers hold sales frequently in its rooms, and that some sell there only. All the property sold by order of the Courts of Chancery in any public sale-room in London is also especially directed to be sold at the Mart. It is of course impossible to give any useful statistical view of the amount of the transactions here within any given time, for this among other reasons—that an immense amount of property, after being exposed for sale and having failed to reach an adequate price, is bought in, and then disposed of privately.

There are various other points that might be mentioned in connection with the Mart, such, for instance, as its various arrangements for the collection and registration of information that may be useful to those who attend it; but a feature of more general interest is that referred to under the head "Arbitrations" in the little printed pamphlet issued by the directors when the establishment first commenced operations; and with an extract from the pages of that publication we conclude (reserving for another opportunity a notice of the most interesting of London auctions, Tattersall's). The passage in question states:—"The convenience which the Auction Mart possesses, from its contiguity to the principal theatres of commerce, may be embraced for every purpose which will not intrude upon the decorum indispensable to be observed in a building devoted to business of importance. Solicitors, arbitrators, committees, meetings of creditors, and others of a general and public kind, will find accommodation adapted to their respective pursuits; and it is particularly wished that the Mart should be considered as a respectable resort, not only upon such affairs

as are immediately connected with the institution, but upon any other concerns which require private and tranquil discussion."

THE PRODUCE OF THE CHERRY.

The cherry is remarkable for the number of favourite beverages prepared from it. But there are also other products which give it a claim to our attention.

The cherry-tree, in a wild state, is found in all the countries of central Europe, as well as in many parts of Russia and Norway; likewise in some parts of Africa and Asia. Indeed it has been supposed by some writers that Asia is the birth-place of this tree; though others dispute the opinion. The cultivated cherry is supposed to have been introduced into England by the Romans; and it is also conjectured that Kent was the county where a cherry-orchard was first planted, and where the fruit has ever since been reared in high perfection. In France the tree has been so much prized, as supplying food to the poor, that a law was passed in 1669, commanding the preservation of all cherry-trees in the royal forests. "The consequence of this was," says Mr. Loudon, "that the forests became so full of fruit-trees, that there was no longer room for the underwood; when, as usual, going to the other extreme, all the fruit-trees were cut down, except such young ones as were included among the number of standard saplings required by the law to be left to secure a supply of timber. This measure, Bosc remarks, was a great calamity for the poor, who, during several months of the year, lived either directly or indirectly on the produce of the mérisier (cherry-tree). Soup made of the fruit, with a little bread and a little butter, was the common nourishment of the wood-cutters and the charcoal-burners of the forest during the winter. At present, he says (writing in 1819), the fruit is wanting, and they have nothing to supply its place. The few cherries which they can gather from the remaining trees are eaten on the spot or sold to make liqueurs."

The different kinds of cherry have, as may be supposed, different degrees of fitness for useful application. With respect to the wood, that of the wild cherry (Cerasus Campestris) is most valued. It is firm, strong, close-grained, and of a reddish colour; and yet soft and easily worked. Being susceptible of receiving a fine polish, it is used as a veneer for various articles of cabinet furniture, as well as for musical instruments, and for turnery-ware, especially in France, where mahogany is not so much used for such purposes as in England. The colour is increased in brilliancy and depth of hue by steeping it for a day or two in lime-water, and polishing it immediately after the steeping: this process is said to prevent the tints from fading by the action of the sun. In some parts of France, where the tree grows very plentifully, the wood is used for various purposes by the common carpenter; and in other parts of the same country it is used for wine-casks, which are believed to imbibe from the wood a quality favourable to the flavour of the wine. In some modes of growth, the tree yields strong straight shoots which make excellent hop-poles, vine-poles, and hoops for casks. When used for fire-wood, it must have been recently cut down, as it acquires by age a rottenness which makes it smoulder like tinder, rather than burn like wood.

The bark of the cherry-tree is composed of four layers, two hard and fibrous, and two soft and spongy. Two of these yield a yellow dye, and also a substitute for cinchona in medicine. The tree yields also a gum, which, according to Hasselquist, sustained alive on one occasion a hundred men during a siege for nearly two months: they took a little of the gum into their mouths and allowed it to remain there till dissolved. The leaves of the cherry are a favourite food with many animals; and they are also used in flavouring liqueurs and custards.

It is, however, for the fruit and its produce that the tree is most valued. So greatly is the fruit relished in most countries, that both holidays and government regulations are made with express reference to it. Thus, in some parts of Cambridgeshire, on a particular Monday at the season when the cherries are ripe, numbers of people go for a holiday to the cherry-orchards, and pay sixpence for permission to eat as much fruit as they like. At other places a similar practice exists, without reference to any particular day. In Lambeth there was a place of public entertainment called the Cherry Gardens, probably so called from having the fruit consumed on the spot during the season. A rural fête takes place in France at the time of the ripening of the cherry. There are in Western Germany avenues of cherry-trees many days' journey in extent, from Strasburg to Munich. These avenues were planted under the auspices of the respective governments, not only for shading travellers, but for their refreshment also; for all persons are allowed to partake of the cherries, on condition of not injuring the trees; but the main crop of fruit when ripe is gathered by the respective proprietors of the land on which it grows. There is a pleasing example furnished in those countries of a sense of honour on the part of those who are thus generously cared for by the government: if a proprietor wishes to preserve the fruit of any particular tree to himself, he ties a wisp of straw to a conspicuous part of one of the branches; and this symbol is always respected by the passing traveller, who avoids this tree while helping himself to fruit.

The fruit of the cherry, unless eaten as it comes from the tree, is almost always used in the preparation of some kind of drink; but in some cases it is prepared in another form. In France, the soft-flesh cherries are dried by exposure to the sun, or in a moderately heated oven. They are preserved in a somewhat similar way in some parts of Germany and Russia: and occasionally preserves, marmalades, lozenges, and other kinds of confectionary are made from them. From the kernels an oil may be obtained, which is used as a substitute for bitter almonds in creams, sugar-plums, and other preparations.

In the northern parts of Germany, the use of *Kirschwasser* (cherry-water) is very prevalent. The drink is pleasant and innocuous, and is provided at public gardens, somewhat analogous to our tea-gardens: when the labours of the day are over, a working-man takes his wife and children to one of these gardens on fine summer evenings, where they join in little amusements going forward, partake of the favourite kirschwasser (which is sold at a very low price), and return home at an early hour.

In Gill's 'Technological Repository,' the following is given as the mode of making kirschwasser in the Black Forest:—"When the cherries are ripe, they are gathered carefully one by one with the hand, rejecting those which are over-ripe, those which have separated from the stalk, and those which are in any degree rotten or damaged. A large quantity being thus collected, they are freed from the stalks, and crushed in a wicker basket made a little concave, and placed over a tub rather smaller than the basket; and the juice, expressed by the bruising, falls into the tub. One-fourth part of the pulpy residue is mixed with the juice, placed in a cask, covered, and allowed to ferment. When the fermentation is complete, the cask is uncovered, and the fermented liquid is drawn off by

a cock at the bottom into a basin. From thence it is conveyed to an alembic, or still, which, as a means of preserving the purity of the flavour in the liquor, is in the best manufactories made of tin; and the distillation goes on till a certain recognised strength is produced. When properly made, it leaves the still in the most limpid and colourless state, and is preserved in stone vessels or bottles to prevent it from receiving any tinge. Of the qualities of this liquor, it is said that 'when the kirschwasser is well made it has no acrid or empyreumatic flavour; and when old, it is not only pleasant to drink, but it possesses also the valuable property of helping the digestion, and warming the stomach by its spirit. Physicians recommend this liqueur in indigestion, and as a preservative against certain maladies. Experiments, a thousand times repeated, have proved that fruits are preserved in brandy; whereas they are decomposed and mollified in the kirschwasser. The valuable qualities which it is known this liqueur possesses, beyond contradiction, increase the interest which every one must feel in seeing that it is prepared with every possible care, not only to free it from the ill taste which it is well known it too often possesses, but also (and which is more important) from the deleterious principle which it contains when not carefully made.'"

In a communication to one of the volumes of the 'Gardener's Magazine,' a mode is described of making kirschwasser "as good as the Swiss kirschwasser." The instructions are, to bruise the fruit, kernels, and pulp in a wooden tub or mortar, and add to every twenty pints of bruised fruit five pints of water, and two pints of gooseberry brandy; the liquor is squeezed from the mixture, and the distillation then goes on: but a little confusion in the description leaves it doubtful whether all, some, or none of the residue is put into the still with the liquor.

Among the other liquors prepared from cherries, *cherry-brandy* is perhaps the best known in England. Black cherries are used for this purpose. A bottle is half filled with them, filled up with brandy or spirits, and allowed to remain a month or two, when it is considered fit for use. Sugar is generally used to sweeten it.

In Russia *cherry-wine* is made by crushing sixty or seventy pounds of cherries in a tub, so that the stones become broken with the pulp; and then adding a pound or two of honey, a small quantity of brandy or wine, and a little yeast. When this mixture has been allowed to ferment, it is cleared of the yeast and poured into kegs or bottles, and then placed in a cool cellar. Wine and brandy are sometimes omitted, and a greater quantity of honey used in lieu of them.

Ratafia and *Maraschino* are two other beverages prepared from cherries. The former is made at Grenoble from a large black cherry; and indeed both of them may serve to illustrate the nature of the drinks which the French call by the general name of *liqueurs*. These liqueurs are palatable spirituous drinks, composed of water, alcohol, sugar, and some aromatic infusion extracted from fruits or seed. According to the proportions in which these several ingredients are combined, the liqueur puts on one of three forms—a ratafia or *eau*, an oil, or a *crême*. Thus, in anise-water, eau-de-noyau, cherry-ratafia, apricot-ratafia, &c., the sugar, the alcohol, and the aromatic extract are in small proportions with respect to the water. When the sugar and the alcohol are in somewhat larger proportion in the liqueur, it assumes the name of an oil, such as the oil of aniseed. When the preparation is of the highest and finest quality, it becomes a crême, or superfine liqueur, such as maraschino, Dantzic water, &c. So far as respects our present subject, then, ratafia and maraschino may be considered two different qualities of liqueurs prepared from the cherry; the one simple and watery, the other rich and highly flavoured.

Mr. Loudon, while speaking of maraschino, says, "The kind of cherry preferred for this purpose is a small acid fruit, called *marasca*, which abounds in the north of Italy, at Trieste, and in Dalmatia. That of Zara, in Dalmatia, is considered the best. All the fruit employed in making the Dalmatian maraschino is cultivated within twenty miles of this city, at the foot of the mountain Clyssa, between Spalatro and Almissa, on the side of a hill planted with vines. The chief difference between the preparation of this liqueur and kirschwasser consists in mixing the mass of bruised cherries with honey; and honey or fine sugar is added to the spirit after it is distilled. The genuine maraschino is as difficult to be met with as genuine Tokay; the greater part of that which is sold as such being nothing more than kirschwasser mixed with water and honey, or water and sugar. The marasca cherry has been cultivated in France with a view to the manufactory of this liqueur in that country; and it has been said that it may be made just as good from the common wild black cherry. It is also said that in Dalmatia the leaves of the tree are made use of in order to give the peculiar aroma which is so much esteemed in the maraschino; and that this perfume may be increased to any extent desired, by mixing the leaves of the *cerasus mahaleb*, the perfumed cherry, with the fruit of the marasca, or even the common geau (black cherry) before distillation."

Labour.—An acre of land that bears here twenty bushels of wheat, another in America which, with the same husbandry, would do the like, are without doubt, of the same natural intrinsic value (utility). But yet, the benefit that mankind receives from the one in a year is worth five pounds, and from the other possibly not worth a penny, if all the profit an Indian received from it were to be valued and sold here; at least, I may truly say, not 1000th. 'Tis labour, then, which puts the greatest part of value upon land, without which it would scarcely be worth anything. 'Tis to that we owe the greatest part of all its useful products: for all that the straw, bran, bread, of that acre of wheat is more worth than the product of an acre of as good land which lies waste, is all the effect of labour. For 'tis not barely the ploughman's pains, the reaper's and thresher's toil, and the baker's sweat that are to be counted into the bread we eat; the labour of those who broke the oxen, who digged and wrought the iron and stones, who felled and framed the timber about the plough, mill, oven, or any other utensils, which are a vast number, requisite to this corn, from its being seed to be sown to its being made bread, must all be charged on the account of labour and received as an effect of that: nature and the earth furnishing only the most worthless materials as in themselves. 'Twould be a strange catalogue of things that industry provided and made use of about every loaf of bread, before it came to our use, if we could trace them. Iron, wood, leather, barks, timber, stone, bricks, coals, lime, cloth, dyeing, drugs, pitch, tar, masts, ropes, and all the materials made use of in the ship that brought away the commodities made use of by any of the workmen to any part of the work; all which 'twould be almost impossible, at least too long, to reckon up.—*Locke on Civil Government.*

The Jungle.—The term jungle is very ill-understood by European readers, who generally associate it with uninhabited forests and almost impenetrable thickets; whereas all the desert and uncultivated parts of India, whether covered with wood or merely suffered to run waste, are styled jungles; and *jungle-wallah* is a term indiscriminately applied to a wild cat or to a gentleman who has been quartered for a considerable period in some desolate part of the country. Persons who are attached to very small stations in remote places, or who reside in solitary houses surrounded only by the habitations of the natives, are said to be living in the jungles.—*Miss Roberts's Scenes in Hindostan.*



[Group of Crow, Sioux, and Pawnee Indians, in the Costumes of their Tribes, reclining in front of a Crow Wigwam.]

VILLAGES OF NORTH AMERICAN INDIANS.

The above cut is from an original drawing by Mr. Catlin, a native of the United States, who has probably seen more of the native tribes of North America than any other white man. His very interesting North American Museum, which was recently exhibited in London, was collected during an intercourse of upwards of seven years with nearly fifty different tribes. A more complete view of the life and habits of a people was never before presented to the eye. We have already (Nos. 181 and 183) given an account of the general state of the native tribes of America when the country was first settled by Europeans, and have noticed the present circumstances of some of the tribes. Nothing apparently can arrest the destruction of uncivilized races of men when their territory is invaded by the civilized. The ploughman and the hunter have interests so different, that either the one or the other must prevail; and all experience has shown that when the cultivator has once taken his stand, there he will maintain his conquest over the soil. Mr. Catlin informs us that out of the 400,000 red men in North America three-fourths are dependent for food on the herds of buffalo on the western side of the Alleghanies, and he expresses an opinion that in eight or ten years these animals will have become so scarce that it will be difficult for the tribes to find the means of subsistence. Indeed so various are the uses of the buffalo to the Indians, that any great diminution in the number of these animals must have considerable effect upon their habits, and render it necessary for them to devise new means of supplying many of their wants. Mr. Catlin says:—"The robes of the animals are worn by the Indians, instead of blankets; their skins, when tanned, are used as coverings for their lodges and for their beds; undressed, they are used for constructing canoes, for saddles, bridles, halters, lassos, and thongs. The horns are shaped into ladles and spoons; the brains are used for dressing the skins; their bones are used for saddle-trees, for war-clubs, and scrapers for graining the robes. Their sinews are used for strings and backs to their bows, for thread to string their beads and sew their dresses. The feet of the animals are boiled, with their hoofs, for glue, with which they fasten their arrow-points and use for various purposes. The hair from the head and shoulders, which is long, is twisted and braided into halters, and the tail is used for a fly-brush."

The Oneidas, Iroquois, Senecas, and Onondagas, who inhabited that portion of the continent which is now covered with cities and thriving settlements, are now little more than historical names, as these powerful tribes have disappeared. Civilization swept them away, because it communicated to them only its vices and diseases. Even within the last six years a very interesting tribe, the Mandans, has become extinct through the ravages of the small-pox. When Mr. Catlin visited them they had two villages about two miles from each other, containing about one thousand souls each. When the disease was first introduced among them, the Mandans were surrounded by several war-parties of the Sioux, and they were therefore confined closely to their villages. The disorder was so malignant that many died a few hours after being attacked. The accounts given to Mr. Catlin state, that so slight were the hopes of the poor people when once attacked, that "nearly half of them destroyed themselves with their knives or guns, or by leaping head-foremost from a thirty-foot ledge of rocks in front of their village." The chief, a man who possessed in an eminent degree all the virtues of the savage, recovered from the attack. "He sat in his wigwam and watched every one of his family die about him, his wives and his little children; when he walked round the village and wept over the final destruction of his tribe,—his warriors all laid low. Returning to his lodge, he laid his family in a pile and covered them with several robes; and, wrapping one round himself, went out upon a hill at a little distance, where he remained several days, determined to

starve himself to death. Here he remained till the sixth day, when he had just strength enough to creep back to his village and enter his own wigwam. Then lying down by the side of his family, he perished of hunger, on the ninth day after he had first left it."

To return, however, to the subject of the cut. "The Crows," Mr. Catlin says, "make the most beautiful lodges of any of the North American tribes." The exterior consists of buffalo hides sewed together, and sometimes dressed as white as linen. They are picturesquely ornamented with porcupine quills, fringed with scalp-locks, and gaily painted. Perhaps there is on one side a picture of the Great Spirit and on the opposite side one of the Evil Spirit. In some as many as forty men can dine, and the height of those of the better sort is twenty-five feet. It is supported by about thirty poles of pine-wood. The Sioux construct their lodges in a similar manner. The manner in which the wigwams of a whole village, consisting perhaps of six hundred habitations, are simultaneously struck is a very singular scene. The chief sends his runners or criers through the village to give a notice of his intention to march in a few hours, and the hour fixed upon. In the meantime preparations are making, and as soon as the lodge of the chief is seen flapping in the wind, from some of the poles having been taken down, the example is followed instantly. In a few moments the chief's lodge is levelled with the ground, and immediately all the other wigwams are struck. The horses and dogs are then loaded in the following manner:—"The poles of a lodge are divided into two bundles, and the small ends of each are fastened upon the shoulders of a horse, leaving the butt ends to drag on the ground on either side. Just behind the horse a brace or pole is tied across, which keeps the poles in their proper places. The lodge or tent, which is rolled up, and also numerous other articles of household and domestic furniture, are placed on the poles behind the horse and upon his back, and on the top of all two, three, and even sometimes four women and children. Each one of these horses has a conductress, who sometimes walks before and leads him with a tremendous pack upon her back. In this way five or six hundred wigwams, with all their furniture, may be seen drawn out for miles, creeping over the grass-covered plain; and three times that number of men, on good horses, strolling in front or on the flank, and in some tribes in the rear. At least five times that number of dogs fall into the rank, and follow in the train and company of the women; and every cur of them who is large enough, and not too cunning to be enslaved, is encumbered with a sort of sledge on which he drags his load—a part of the household goods and furniture of the lodge to which he belongs."

One of the Mandan villages which Mr. Catlin visited was admirably selected on an angle of land forty or fifty feet above the bed of a river, so that the base of the angle towards the town was the only part requiring protection, the two sides being flanked by the river, with its banks of nearly solid rock. The base was defended by a stockade of timbers of a foot or more in diameter, and eighteen feet high, at sufficient distances to admit of the defenders discharging their weapons between them. The ditch, of three or four feet in depth, was on the inward side of the village. The lodges were closely grouped together, with just room enough to walk or ride between them. They were all of a circular form, and from forty to sixty feet in diameter, and within were neat and comfortable. The walls were firmly constructed with timbers of eight or nine inches in diameter, and six feet high, standing closely together, and supported on the outside by an embankment of mud. Then resting on these timbers were as many more, each about twenty-five feet in height, which were inclined at an angle of forty-five degrees, leaving an aperture at the apex of three or four feet wide for a chimney and a skylight. The roof is supported by timbers in the interior of the lodge. Outside, the roof is covered with a mat of willow boughs of half a foot or more in thickness, on which earth is spread to the depth of two or three feet, which is covered with a clay that soon hardens and becomes impervious to water. The top of the lodge is the grand lounge of the whole family in pleasant weather. But only an eye-witness can describe the scenes which an Indian village presents. Mr. Catlin, speaking of this Mandan village, says—"The groups of lodges around me present a very curious appearance. On the tops are to be seen groups standing and reclining; stern warriors, like statues, standing in dignified groups, wrapped in their painted robes, with their heads decked and plumed with quills of the war-eagle, extending their long arms to the east or the west, to the scenes of their battles, which they are recounting over to each other. In another direction are wooing lovers, the swain playing on his simple lute. On other lodges, and beyond them, groups are engaged in games of the 'mocassin' or the 'platter.' Some are to be seen manufacturing robes and dresses, and others, fatigued with amusements or occupations, have stretched their limbs to enjoy the luxury of sleep while basking in the sun. Besides the groups of the living, there are on the roofs of the lodges buffaloes' skulls, skin canoes, pots and pottery, sledges; and, suspended on poles, erected some twenty feet above the doors of their wigwams, are displayed in a pleasant day the scalps of warriors preserved as trophies. In other parts are raised on poles the warriors' pure and whitened shields and quivers, with medicine-bags attached; and here and there a sacrifice of red cloth or other costly stuff offered up to the Great Spirit over the door of some benignant chief." Contiguous to the village are a hundred scaffolds, each consisting of four upright posts, on which their dead are placed in their best costume.

The Comanchees make their wigwams of long prairie-grass thatched over poles, which are fastened in the ground and bent in at the top, giving them from a distance the appearance of bee-hives. Where the buffaloes are numerous, skins are the materials employed; and in all cases the difference of style or material is the result of natural causes, just as formerly in the woodland parts of England timber dwellings prevailed, while in the champaign other materials were used; and as the traveller in a long day's journey will pass through districts where the cottages (the truest criterion) are in one tract thatched, in the next perhaps covered with tiles, in another with blue slate, and in a fourth with a slate of quite another kind.

MONEY-TOKENS AND SIEGE-PIECES.

The real value of money, considered merely as a representative of all other marketable values, involves considerations of much difficulty in reference to certain points in political economy, principally from the prevalence of an idea that money and wealth are the same thing—that money is the object which all desire, instead of merely the means for obtaining that object. Without touching on these nice and complicated inquiries, however, there are a few details which may serve to illustrate the value of money, simply as a medium of exchange, by showing the inconvenience resulting from a deficiency of it, even when poverty is not the cause of this deficiency.

So long as we have metallic coins varying in value from one pound to one farthing, we can regulate the quantities of the commodities purchased with great

nicety, by paying in coins of greater or less value. But if the coins issued by the government were of but few denominations—if, for example, there were none of lower value than a shilling, we should soon find retail trade thrown into the utmost confusion, and indeed almost annihilated, even if there were an ample supply of larger coins; because, if a purchaser had no coin so small in value as the quantity of the article which he wished to purchase, he would have to buy on credit, or purchase more than he wanted, or arrange with some third party to make joint purchases. The state of things in Ireland at the commencement of George the Second's reign will illustrate this point. At that period the scarcity of silver coins was so great, that those who employed workmen of any kind continued to employ them until their wages amounted to a double pistole or a moidore (which were the gold coins most prevalent at that time in Ireland). These coins were paid to a body of workmen, who then adjourned to an alehouse or a brandy-shop, and divided the money amongst themselves as they best could. As it was impossible to effect this division without silver, they had to pay a premium, amounting to tenpence or a shilling, for changing one of the gold coins for silver, besides spending another portion of their money at the alehouse.

Whenever such a state of things occurs, the shopkeepers and manufacturers have always been desirous of issuing *money-tokens*, that is, pieces of copper or of silver, stamped with some device, and exchangeable at their shops as fractional parts of larger coins, so as to serve all the purposes of money. It is always deemed dangerous to allow the privilege of coinage to pass out of the hands of the government; and the prevalence of this custom shows how annoying a deficiency of small coinage is felt to be.

In the reign of Henry VIII. private tokens were used to supply the want of silver coins; and the Earl of Surrey, Lord Lieutenant of Ireland, was obliged to sue to be recalled on account of the obstruction to his proceedings by reason of the deficiency of circulating medium. By the reign of Elizabeth, the use of private tokens for money, which were stamped by inferior tradesmen, such as grocers, vintners, chandlers, and bakers, had grown to such an extent as to be a subject of frequent complaint. They were made of lead, tin, latten (a mixed metal of copper and zinc), and even of leather. Of these coarse materials were formed farthings and halfpence, which brought discredit on the general coinage of the country, and at the same time inflicted a loss on the poor, since these tokens could only be received at the shop from whence they had been first issued. It seemed to be a deficiency in the smaller coins, such as halfpence and farthings, that led to the issue of these tokens; and proposals were made to the government to strike legal farthings. It was first suggested to form them of mixed silver and copper —then of silver only—then of copper only; and an order was issued prohibiting the circulation of tradesmen's tokens. But it does not appear that the plans of the government were carried out, for no farthings were issued. A sort of medium measure was however adopted, whereby important cities or corporations were allowed to issue tokens, although individuals could not. Thus, the queen granted a licence to the city of Bristol to coin tokens, which were made of copper, with a ship on one side, and C B on the other. They were current in and near that city, for the purchase of small articles.

By the time of James the First the inconvenience resulting from a deficiency of small coinage was again much felt. Private traders, finding themselves unable to carry on their business without smaller money than the legal coins, were driven by necessity to provide something to supply the deficiency; and, accordingly, they adopted the practice of coining farthing-tokens in lead. In 1613 a proclamation was issued ordering the cessation of this custom. It commenced with an acknowledgment, that "in times past some toleration had existed in the realm of tokens of lead, commonly known by the name of farthing-tokens, to pass between vintners, tapsters, chandlers, bakers, and other like tradesmen, and their customers; whereby such small portions and quantities of things vendible, as the necessity and use, especially of the poorer sort of people, oftentimes required, might be conveniently bought and sold, without enforcement to buy more ware than would serve for their use and occasion." But it was objected, that as these tokens had not general currency throughout the country, poor purchasers were, to a great extent, at the mercy of the shopkeepers. It was estimated that there were in London three thousand persons who issued leaden farthing-tokens, to the average amount of 5*l.* a year each. To remedy the evil, the king granted a licence to Lord Harrington, for three years, to coin copper farthings for general use throughout the kingdom, it being optional to the public to make use of these coins or not. The people entertained some distrust of these new farthings, and took them very slowly, although facilities were offered for exchanging silver for farthings in different parts of England. There was a profit to be gained by Lord Harrington by the issue of the farthings, and this probably tended to create a dislike to the scheme. In 1616 it was again found that the tradesmen issued their own tokens, and great complaints and frequent proclamations were made.

In the reign of Charles the Second, various persons, in nearly all the cities and towns throughout Ireland, were in the habit of striking brass and copper tokens in great number, with such stamps as they pleased; these they vended for a penny each in exchange, under pretence that, when they were called in or decried, the persons who uttered them would receive them back again at the rates for which they had been issued. So gross was the fraud thus effected, that the issuers received nearly twenty shillings in good silver coin for as many tokens as did not cost them more than twenty pence; and before the time came for these tokens to be exchanged, the issuers kept out of the way, and the poor people suffered the loss. A proclamation was therefore issued, prohibiting the making of such tokens, or the circulation of them, if made. Both in England and in Ireland, however, there was so much profit to be made in various ways by the issue of money-tokens, that the government experienced the utmost difficulty in suppressing the system. A farthing-office was established in London, where facilities were afforded for obtaining legal farthings; and severe punishments were threatened to those who used tokens: so that at length, as the people generally had no reason to distrust legal farthings if issued by the government in a proper manner, the issuers gradually relinquished a system which had its origin in convenience, and was kept up afterwards by fraud.

But in Ireland the march of improvement was, as it has always been, more tardy. The government, instead of issuing halfpence and farthings, gave a patent for so doing to Sir Thomas Armstrong, who made it a source of profit; he was authorized to enter any house or any ship in search of counterfeit coins; and his coins were declared a legal tender, and bound to be taken to the value of five shillings in every hundred pounds. This system appears to have continued for some time, and to have been made a source of patronage. In the time of George II., as we have before observed, silver was so scarce in Ireland as to lead to great losses on the part of the working men; in many cases they really

had not silver or copper to purchase their small wares, although they might have a gold coin, and were forced to pay an extra price for their commodities as a means of obtaining change. The smaller coins of copper were also scarce; and manufacturers were often obliged to pay their men with tallies, or tokens, in card, signed upon the back, to be afterwards exchanged for money; while at the same time counterfeit coins, called raps, were in circulation, made of such bad metal that what passed for a halfpenny was not worth half a farthing. A Mr. Wood received a patent for coining halfpence and farthings for fourteen years, by which it was estimated that he would clear about 6000*l.* a year. This plan was attacked most fiercely by Dean Swift, even from the pulpit, and the passions of the people became thereby so roused, that, after many investigations and proclamations, the government induced Mr. Wood to abandon his patent altogether. The scarcity of small change still continued; and the issue of copper and silver tokens for small sums took place extensively. Mr. Maculla, a brazier of Dublin, suggested a plan for issuing tokens for the whole kingdom; Dean Swift (who was then extremely popular in Ireland) promulgated another; and all, as it would appear, because the government would not allow to Ireland the privilege of having a mint of her own.

Without going farther into details, it may be sufficient to have thus explained the general causes which led to the issuing of money-tokens. It has always been occasioned by a deficient supply of small coins, or else by a dislike on the part of the people to the circumstances under which coins have been issued. During the last war, when so much specie was drained from the kingdom in various ways, tradesmen's tokens were issued in a great many English towns, each having currency within a very limited circle; but since that period the coinages have been sufficiently frequent to keep up a supply of small change; and thus the same coin is equally current in every part of the kingdom, one of the great advantages attending a national currency.

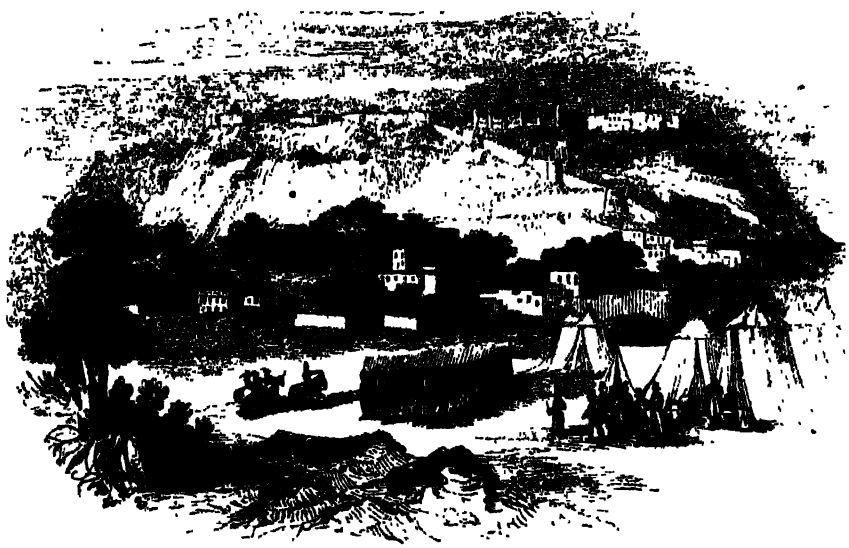
Siege-pieces are only another name for a particular kind of money-token, which was prevalent during the troubles of the Commonwealth. When the king was driven about from town to town, and besieged in one castle after another, his treasury soon became exhausted, and his faithful adherents gave up their gold and silver plate, to be made into substitutes for coin. These small pieces were called siege-pieces, or money of necessity, and were formed with a rudeness corresponding with the haste in which they were issued. They were in many cases simply rude masses of plate, clipped off, stamped with some hastily-formed device, and even retaining in certain instances the mouldings of the salvers from which they had been cut. Some of these pieces are stamped with the name of the castle wherein they were struck, but there are various others which only bear an imperfect representation of the place. The frequent removals of the king to various parts of the kingdom obliged him to establish several mints, at the cities and towns of London, York, Oxford, Worcester, Edinburgh, Dublin, Exeter, Cork, Chester, Carlisle, Aberystwith, Colchester, Newark, Pontefract, Shrewsbury, Scarborough, and other places.

It was about the year 1642 that this system commenced, when Charles I., by seizing a quantity of bullion which had been deposited in the Mint by some Spanish merchants, and by a debasement of the silver coin to one-fourth of its value, had hastened the arrival of his own troubles and difficulties. In January of that year the royal family were so straitened for money, that the queen was obliged to coin or sell her household plate for the supply of common necessaries. When the breach between the king and the parliament became irreconcilable, both parties endeavoured to secure money for carrying on the contest. The parliament, besides eight per cent. for all money sent into them, offered to receive family plate at its full value, with an additional one shilling per ounce for the workmanship that had been bestowed on the articles; and at the same time made an ordinance for assessing all those who should not contribute according to their ability. The king sent forth a counter-proclamation, calling on his subjects to assist him, and threatening with the kingly power all those who sent in plate to the parliament. Whether it was that the parliament offered high terms, or that the general exasperation against the king was great, the quantity of plate sent in was immense, and gave rise to many satirical remarks, of which the following formed part of a poem published at the time:—

"And now, my Lord, since you have London left,
Where merchants' wives dine cheap, and as cheap sup,
Where fools themselves have of their plate bereft,
And sigh and drink in the coarse pewter cup,
Where's not a silver spoon left, not that given then
When the first cockney was made Christian:
No, not a bodkin, pintese; all they send,
Or carry all, whatever they can hap on,
E'en to the pretty picktooth, whose each end
Oft purged the relics of continual capon.
Nothing must stay behind, nothing must tarry.
No, not the ring by which dear Joan took Harry."

Meanwhile the universities and many private individuals came forward to assist the king with plate. The heads of most of the colleges sent him word that they had a good deal of plate which was at his service. The plate was sent to the king at Nottingham, and he sent secret orders to the officers of the Mint to repair thither to coin the plate; but the parliament forestalled him, and forbade the officers to obey him; so that the king had to use the plate in small pieces, or to rudely coin it into any form most convenient. After the battle of Edge Hill, the colleges sent to the king nearly all their remaining plate, for a similar purpose. A proclamation was issued by the king's government in Ireland, calling on the inhabitants of Dublin to send in plate at a certain rate per ounce; this they did to a considerable extent, and the plate so produced was hastily formed into rude coins, stamped either with the current value or with the weight. Repeated instances are recorded as having occurred about that period, of the English nobility having given up their family plate to the king; and when this occurred at the times of his greatest difficulty, he had neither time nor convenience for converting it into coined money, and therefore had it merely cut into pieces, and rudely stamped into what obtained the name of *siege-pieces*.

Log-houses in Kamtchatka.—A jourta of this sort is generally a frame of timber put into a square hole, four or five feet deep; and within the frame a quantity of stakes are set close together, inclining a little inwards, and the earth thrown against them. The stakes are left round on the outside, but hewed within, and the top is framed over in the same manner, and is arched and supported by stanchions. In the centre of the roof is a square hole that serves the double purpose of a door and a chimney, the inhabitants passing in or out by means of a piece of timber placed against the edge of the hole, with notches cut in it to receive the feet—a miserable substitute for a ladder. The top and sides are covered without with a quantity of earth, and sodded. At one end there is a large hole with a stopper to it, which is opened when the oven is heating, to force the smoke out at the door. When once heated, and the stopper closed, jourtas are warmer than most wooden houses, and were it not for the smoke, that is excessive, they would be comfortable winter dwellings. They are made of various sizes and descriptions; and some of them that have floors are really decent, and bear something the appearance of a house under ground.—*Dobell's Travels in Kamtchatka and Siberia.*



[Fortress of Gwalior.]

GWALIOR, OR GUALIOR.

The city and fortress of Gwalior, in Hindustan, are about seventy-five miles south from the city of Agra, in 26° 18′ N. lat., 78° 5′ E. long.

The city of Gwalior, which stands at the foot of the lofty mass of rock on which the fortress of Gwalior is situated, is the capital of the Gwalior state, and the court residence of the Maharaja Jyajee Rao Sindia, the sovereign of that state. The city is not walled, but at the entrances of the parallel streets, which run up to the side of the rocky hill, there are stone gateways, with strong gates, sufficient to afford a short means of defence against an irregular attack. The houses are built with stone, of which the neighbourhood affords an abundant supply. The general appearance of the streets, however, is somewhat mean, and the public buildings are not distinguished for architectural beauty. Trees are intermixed among the houses and minarets, as is usual in Indian towns. The number of inhabitants is about thirty thousand.

The fortress of Gwalior is high above the city, on the summit of the hill of rock at the base of which the city stands. The rock rises precipitously from the plain, and is perfectly isolated, but an amphitheatre of hills, at the distance of from one to three miles, partly surrounds it. The rock is long, narrow, and lofty. The length at the bottom is above three miles, at the top nearly two miles; the width at the top is irregular, but seldom exceeds three hundred yards. The entire height is about three hundred and fifty feet, and the whole rock is precipitous, but the upper part, which is about two hundred feet high, is nearly perpendicular, for the most part by nature, but partly by scarping the rock. The area at the top is nearly level, and is covered with numerous buildings and with cultivated ground. There are wells and reservoirs for water, and all things needful to enable the garrison to sustain a siege. The only means of access to the fortress is by steps up the side of the rock; the exterior part of the steps is defended by a wall and bastions, and the ascent is further protected by stone gateways. A stone parapet extends round the brow of the rock on every side.

Of all the hill fortresses of India that of Gwalior is the largest, the strongest, and the most magnificent. On looking up from the city at the precipitous mass and the defences which crown the brow of the rock, the appearance is described as of surpassing grandeur. Before the introduction of European warfare the fortress was deemed impregnable; and even now, with all the appliances of shells and rockets and engineering skill, the conquest would be difficult, and would probably require much time. Notwithstanding its strength, however, the fortress has been several times taken and re-taken by the Mohammedans and the Hindoos, sometimes by slow siege, at other times by treachery, by corruption of the garrison, and similar means.

In 1780 the fortress of Gwalior was taken from the Mahrattas, who then held it, by Colonel Popham, or rather, by Major Bruce and the escalading party whom he led. The successful result of the enterprise was as extraordinary as the spirit of romantic daring with which it was executed. Colonel Popham was encamped at Rycpoor, eight miles from Gwalior. He was informed by the Rana of Gohud, from whom the fortress had been taken by the Mahrattas, that some banditti who infested the neighbourhood had once climbed the rock and got into the fortress. He engaged some of them to make the attempt again; they again succeeded, and ascertained that the guard, after going the rounds, were accustomed to lie down to sleep. Major William Bruce, the brother of Bruce the Abyssinian traveller, then undertook to scale the walls of the fortress with a party of sepoy grenadiers. Colonel Popham had ladders both of wood and rope made with the utmost secrecy, and shoes of woollen lined with cotton for the scaling-party, to make the ascent as noiseless as possible.

At eleven o'clock on the night of the 3rd of August, 1780, Major Bruce set forward with Lieutenant Cameron, the engineer, and twenty sepoy grenadiers, and, marching by unfrequented ways, they reached Gwalior a little before daybreak. Colonel Popham followed with two battalions. Bruce, on arriving at the foot of the rock, saw lights, and heard the guards cough, which was the Mahratta mode of signifying "All 's well." When the lights disappeared the wooden ladders were placed, and one of the robbers,

having climbed over the wall, returned with the welcome news that the guards had laid down to sleep. Bruce, Cameron, and the sepoys now mounted from crag to crag by means of the wooden ladders; and Cameron having gone up and fastened the rope-ladders to the battlements, Bruce and the sepoys ascended, got over the wall without being discovered, and squatted down behind it. Three of the sepoys, however, were so inconsiderate as to fire on three of the garrison who were lying near them. The three men were shot dead; the noise alarmed the garrison, and they rushed to the spot in great numbers, but as they were ignorant of the force of the assailing party, they were kept in check by the brisk fire of the sepoys till Popham himself got up with a reinforcement. The garrison then retreated to the inner buildings, and, after discharging a few rockets, fled precipitately through the gate; while the principal officers, thus deserted, assembled in one of the houses, and hung out a white flag. Popham immediately sent an officer with assurances of quarter and protection; and thus, in about two hours, this apparently impregnable fortress was taken by a small escalading party of British and sepoys, without the loss of a single man, and with only twenty wounded.

Gwalior was formerly the capital of the small state of Gohud, but during the contentions between the Mogul government and the Mahrattas the Rana of Gohud was rarely allowed the use of his own city and fortress, and was generally compelled to pay tribute to one or the other. After the British obtained possession of it by Colonel Popham's escalade, it was given up to the Rana of Gohud, on certain conditions of remuneration for our protection; but failing to fulfil those conditions, the Rana was left to defend himself against the Mahrattas as well as he could. Madajee Sindia obtained possession of the fortress after a siege of many months, and then only by corrupting a part of the garrison. The territory of Gohud, with its capital and fortress, was in the possession of Holkar when the Mahratta war broke out in 1803. After his final subjugation, the British authorities, by the treaty of Muttra, November 23, 1805, transferred Gohud and its capital to Dowlut Rao Sindia, in whose family they still remain, forming a portion of the state of Gwalior, whose sovereign is styled Maharaja (great prince) of Gwalior.

The Mahratta family of Sindia (or Scindia) is of comparatively modern origin. Ranojee Sindia, the first who distinguished himself, was a potail, or headman of a Hindoo village, when he was appointed by the Paishwa Badjee Rao to the humble office of his slipper-bearer. He was a shrewd and enterprising man, and in 1743 had risen to the highest rank of Mahratta chiefs, and had obtained the hereditary government of about one half of the large province of Malwa. After his death, Madajee Sindia, one of his sons, became the most powerful of the Mahratta chiefs —so powerful, indeed, that he became, to use the words of Sir John Malcolm, "the actual sovereign of Hindustan from the Sutleje to Agra, the conqueror of the princes of Rajpootana, the commander of an army composed of sixteen battalions of regular infantry, five hundred pieces of cannon, and one hundred thousand horse, the possessor of two-thirds of Malwa and some of the finest provinces in the Deccan." Madajee Sindia died in 1794, and, leaving no sons, was succeeded by Dowlut Rao Sindia, who was the grandson of Tukajee Sindia, Madajee's brother. In the Mahratta war which broke out in 1803, Dowlut Rao Sindia and the Rajah of Berar were the chief princes implicated, and after a series of brilliant actions, by Lord Lake in Upper India and by Major-General Wellesley in Central India, the Mahratta forces were completely defeated, and Sindia was compelled to cede territory to the amount of fifty thousand square miles, which is almost as much as the area of England, exclusive of Wales. By a treaty of alliance, February 27, 1804, Dowlut Rao Sindia engaged to receive a British auxiliary force in those dominions which he was allowed to retain, which were still of great extent. The territory of Gohud was afterwards ceded to him, as we have before stated. He kept aloof from the Mahratta war of 1818, and thus preserved his territories. He died on March 21, 1827. Janko Rao Sindia was elected by the widow as successor to her late husband. He died last year, and his widow has elected Jyajee Rao Sindia, who was the nearest relative of Janko Rao, and is now the reigning Maharaja of Gwalior. Being yet too young to act for himself, Mama Sahib was appointed regent by the widow (the Maharanee, or Mahabace, as she is styled), with the concurrence of the British authorities; but the regent was driven away, and the Dada Khasgee Walla, a rich and powerful Brahmin, was appointed in his place. This proceeding, hostile to British interests and opposed to British superintendence, led to the two late sanguinary battles at Maharajpoor and Punniah.

PLANTATIONS ON DRIFTING SANDS.

THE attention of agriculturists has been frequently directed to the best mode of fixing the layers of drifting sand which sometimes occur in districts bordering on the sea, or exposed to wind from particular quarters. If these sandy spots were merely barren and still, doing neither good nor harm, the matter would have been of less importance; but shifting sands are liable from their very nature to bring great destruction to neighbouring towns and villages.

Suffolk and Norfolk have been at different times subject to sand-floods of this description from sand-hills lying not far from the coast. The general progress of these floods has been somewhat as follows Violent winds break through the turf that covers these hills, and then the sand, lying loose and naked, is soon carried down upon the plains, where it covers and buries the grass, and in a very little time destroys the light turf; then, mixing itself with the sand underneath, it becomes one bed of dry matter. A large body of sand being thus got together, nothing stops its progress, but at every storm it rolls over more and more ground; so that in a few years it extends itself to a vast distance, especially where the ground over which it passes is of the same sandy nature, and only covered with a thin turf. In some parts of Suffolk the ground encourages this change so greatly, that a bed of sand thus loosened from a neighbouring hill, and covering only a few acres at first, will ultimately deluge a large area, not being arrested by rising ground or any other impediments.

In the sixth volume of the 'Transactions' of the Royal Irish Academy is a paper by the Rev. W. Hamilton, on the effects of the westerly winds of Ireland in causing sands to shift, and to bury houses and villages beneath them. On many parts of the Irish coasts houses and villages have been actually dug out of sand-hills, each one having, like a miniature Pompeii or Herculaneum, been overwhelmed by an enemy which it could not resist. A case is mentioned in which the ruins of a village were to be seen in the county of Antrim, in 1783, the inhabitants having been all driven away by the gradual influx of sand. A similar instance was observable in the county of Donegal in 1787. In another instance Mr. Hamilton, while taking an excursion through Donegal, had great difficulty in finding the house of a guide to whom he had been directed. "After much search," he states, "I perceived its roof

just emerging from the sands. The owner told me that his house was not long built, and had at first a considerable tract of pasture-ground between it and the seashore; but that, of late, he was every year obliged, with great labour, to dig it out of the encroaching sands, and purposed shortly to remove it to the opposite shore of a lake called Mullochdearg, which lay behind the house, in despair of being able to maintain its present situation."

The same writer describes a spot in which the boundary between two estates was only marked by a heap of iron scoriæ amid shifting sands; the scoriæ pointing out the spot where a smith's forge had existed before the sands had driven away the smith and buried his forge. In another case an elegant mansion had become almost buried. This mansion was situated in the peninsula of Rossgull in Donegal, and had been inhabited by the family of the Boynes. The approach to the house was from a level green on the shore, through a succession of embattled courts and hanging terraces, rising one above another; and the rear of the house was bounded by gardens and parks well laid out. Such was the house in its prime; and Mr. Hamilton then notices the state in which he found it, after the approach of sand-floods. "At present every object in this place presents to view peculiar characters of desolation. The gardens are totally denuded of trees and shrubs by the fury of the western winds; their walls, unable to sustain the mass of overbearing sands, have bent before the accumulated pressure, and, overthrown in numberless places, have given free passage to this restless enemy of all fertility. The courts, the flights of steps, the terraces, are all involved in equal ruin, and their limits only discoverable by tops of embattled walls, visible amid hills of sand. The mansion itself, yielding to the unconquerable fury of the tempest, approaches fast to destruction. The freighted whirlwind, howling through every avenue and crevice, bears incessantly along its drifted burden, which has already filled the lower apartments of the building, and begins now to rise above the once elevated thresholds. Fields, fences, villages, involved in common desolation, are reduced to one undistinguishable scene of sterile uniformity; and twelve hundred acres of land are said thus to have been buried, within a short period, in irrecoverable ruin."

It is obvious that if any means could be devised of giving a fixity to the sand, whereby it would not be acted on by the wind, much of the evil above described would be avoided. One writer has suggested that a way of stopping the progress of the drifting sand (supposing the motion to have once commenced) would be by planting hedges of furze one over another: as these become levelled, they will by degrees stop or divert the progress; and cases have been known where the spread of the sand has been checked by this means after a rise of twenty feet had taken place.

The drift sands of the Outer Hebrides have in some places been consolidated and covered with verdure in the following manner, described in the 'Quarterly Journal of Agriculture.' Square pieces of turf, cut from solid sward, are laid upon the drifting surface at stated intervals apart; bearing nearer together in steep places, and farther apart in places of less declivity, while in very steep places they are placed close together. These turfs prevent the sand from drifting, even in the intervals between them. Mr. Macleod, of the island of Harris, has adopted another method, by which he has brought into useful permanent pasture upwards of a hundred and twenty acres of useless drifting sand. The operation is performed in the month of September, by the aid of the *arundo arenaria*, or bent grass. These plants are cut about two inches below the surface with a small thin-edged spade, having a small handle, which a man can use in his right hand, at the same time taking hold of the grass with his left. Other persons carry these plants to the drifting sand, where they are planted in a hole or cut from eight to twelve inches deep, made with a large narrow-pointed spade. A handful of the *arundo* is put into each of these cuts, the cuts or holes being about a foot apart. When properly fixed in the drifting sand, the roots begin to grow and spread under the surface, in the course of a month after planting. This grass is relished by cattle in summer, but it is of greater value when preserved in the ground for wintering cattle. Neither wind, rain, nor frost will destroy it, but the old grass naturally decays towards the latter end of spring and the beginning of summer, as the new crop grows. White and red clover will grow spontaneously among this grass in the course of a few years, provided it is well secured.

The *pinaster*, or *cluster-pine*, has been used with great success as a tree for fixing drifting sands. This is a tree which seldom thrives except in a deep sand or sandy loam; and hence its fitness for this purpose. On the estate of Westwich House, in Norfolk, a magnificent double avenue of pinasters has been formed, five miles in length, in a bleak situation, and in a sandy soil resting on a subsoil of coarse hard gravel. It was in France that the plan of planting this tree on shifting sands was adopted about the year 1789. There are very extensive downs or sand-hills between Dunkirk and Nieuport, between Calais and Boulogne, and between the rivers Adour and Gironde. In the Gulf of Gascony the downs are composed of drifting sands, covering three hundred square miles. This immense tract has been compared to a sea, which, when agitated to fury by a tempest, had been suddenly fixed and changed to sand. Before the attempts to fix the sand, the district offered nothing to the eye but a monotonous repetition of white wavy mountains, perfectly destitute of vegetation. In times of violent storms of wind, the surface of these downs was entirely changed; the sandy hills often becoming valleys, and the reverse. The sand, on these occasions, was often carried up into the interior of the country, covering cultivated fields, villages, and even entire forests. This took place so gradually (by the sand sweeping along the surface and thus raising it, or falling from the air in a shower of particles), that nothing was destroyed; the sand gradually rose among crops as if they were inundated with water; and the herbage and the tops of trees appeared quite green and healthy, even to the moment of their being overwhelmed with the sand, which is so very fine as to resemble that used in hour-glasses.

It was in such a district that M. Bremontier began, in 1789, his attempts to fix the drifting sands by planting pinaster-trees. The mode adopted is mainly as follows:—on the surface are sown seeds of the common *broom*, mingled with those of the *pinaster*: commencing on the side next the sea, or on that from which the wind generally prevails, and sowing in narrow zones, in a direction at right angles to that of the wind; the first sown zone being protected by a line of hurdles, this zone protecting the second, the second the third, and so on, till the whole breadth of the downs is covered with plantation. From four to five pounds of broom-seed, and from one to two pounds of pinaster-seed, are sown per acre, and immediately covered with branches of pines, or of other trees, with the leaves on, brought from the nearest woods, these branches being intended to shelter and protect the seed, and to retain the sand. The branches are laid down in a regular manner in the direction of the wind, and overlapping one another, so as to produce a sort of thatching to the surface; and, in places very much exposed, rods are laid across the branches, and

firmly hooked down. In six weeks or two months the broom-seeds have produced branches six inches in height, and which attain three or four times that height in the course of the first season. The pinasters do not rise above three or four inches the first year; and it is seven or eight years before they completely overtop the broom, which often attains on the French downs a height of fifteen or eighteen feet. At the age of ten or twelve years, the pinasters have in a great measure suffocated the broom, and they are then thinned, the branches cut off being used for the purpose of thatching downs not yet recovered, and the trunks and roots cut into pieces and burned to make tar and charcoal. In about twenty years the trees rise to twenty or thirty feet in height; and in that stage they produce resin, which forms a valuable product for ten or twelve years longer. After this the trees are cut down, the trunks burned for tar and charcoal, the branches employed in thatching other moors, and the seeds giving birth to a new race of plants.

Such is the nature of the excellent plan adopted by M. Bremontier, whereby not only were the shifting sands fixed, but timber, charcoal, tar, and resin were produced from a district before not only useless, but much worse than useless to the neighbouring villages. In 1811 a commission appointed by the French government reported that about twelve thousand five hundred acres of downs had been covered with thriving plantations; they also reported that it was found that a thatching or covering of any kind of vegetable herbage, such as straw, rushes, reeds, sea-weed, &c., might be used instead of branches, and was even preferable. Another improvement, which had been tried and found very successful, was the substitution of a fence of boards for that of wattled hurdles, as more completely excluding the wind. The plantations thus created out of a sandy waste, together with others in the Landes of Bordeaux, and between that city and Bayonne, are called *pignadas*, and now constitute the principal riches of the inhabitants, who are almost entirely supported by the preparation of resin and tar from the pinaster-trees raised in what were once sandy downs.

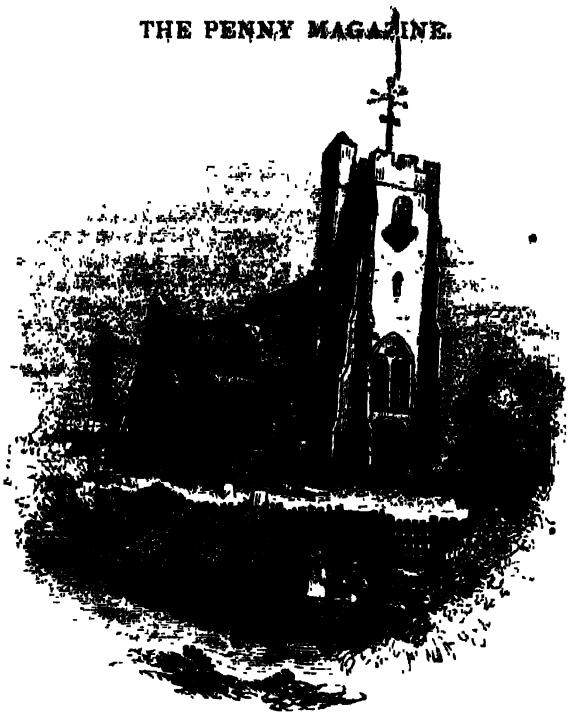
RAMBLES FROM RAILWAYS.

THE RIVER MOLE.—No. II.

AFTER quitting Betchworth the pedestrian will take the path by the mill to Dorking; or he may, if he please, step aside a little to Deepden, where is a fine house with some good pictures, and around it many walks such as it is a pity to lose. Dorking is a long, neat, and quiet town, famous for its poultry, butter, and other good things; and if we had time, and this were the place to describe it, would be worth a more careful survey. We believe it is quite unmatched, for the number and variety of pleasant rambles it offers, by any other town within the same distance of London. Such walks, for instance, as those about Deepden, of which we have spoken; along the top of the fine range of downs towards Guildford; Leith Hill, the stroll towards which is very agreeable, while the view from its summit is on a clear day a treat of no ordinary kind; the vale of Mickelham, along which we shall wander presently; and then there is Wotton, the birthplace and, for the last years of his life, the residence of the excellent John Evelyn, in allusion to whose 'Sylva, or a Discourse of Forest-Trees,' it has been said, by D'Israeli, "The present navy of Great Britain has been constructed with the oaks which the genius of Evelyn planted." Nor will this appear hyperbolical, if we notice what he says in the dedication of one of the later editions to Charles II.:—"I need not acquaint your Majesty how many millions of timber-trees, besides infinite others, have been propagated and planted throughout your vast dominions at the instigation and by the sole direction of this work, because your Majesty has been pleased to own it publicly for my encouragement." The discourse was written in answer to certain inquiries sent by the Commissioners of the Navy to the Royal Society, and was the first book printed by order of that Society. It is filled with learning, for Evelyn was enthusiastically attached to his subject, and had been for years in the habit of collecting everything he met with in his reading that could do honour to his favourite trees. But though there is an air of pedantry and something of formality about it, the book is an agreeable one to read, and has not yet lost its value as a guide to the forester. Evelyn was a model of an English gentleman of that period, and though connected with the court of the profligate Charles II., he retained to the last uninjured the manly virtues of his character. His 'Diary,' first published about twenty-five years ago, is exceedingly interesting as a picture of the manners of his time, and it exhibits his many excellencies in an unobtrusive manner. Though attached in no ordinary degree to a country life, he was active in his duties as a citizen; indeed his conduct during the Great Plague might almost be called heroic. Upon the declaration of war with the Dutch, Charles appointed Evelyn a commissioner for taking care of the sick and wounded and prisoners arising therefrom. A short time before the appearance of the plague in London, Evelyn's charge had been removed to the Savoy; and during that fearful visitation neither the entreaties of his friends nor his own danger could induce him to quit the scene of his duties. But having sent his wife and family to Wotton, he determined to stay himself, trusting, as he says, "in the providence and goodness of God." The anxiety his situation must have produced was increased to a most painful extent by the court having neglected at this trying time to furnish him with the necessary funds to relieve the miseries of his charge. "One fortnight," he says in a letter written at this time, "has made me feel the utmost of miseries that can befall a person in my station and with my affections. To have twenty-five thousand prisoners and fifteen hundred sick and wounded men to take care of, without one penny of money and above 2000*l.* indebted." "Our prisoners beg of us as a mercy to knock them on the head, for we have no bread to relieve the dying creatures. I beseech your honour let us not be reputed barbarians." At another time he says he and Sir William D'Oily have lost all their "servants, officers, and most necessary attendants, and have nothing left us to expose but our persons, which are every moment at the mercy of a raging pestilence." He was in London too during the Great Fire which followed the pestilence, and his letters give the most vivid description of it perhaps extant. Evelyn was the friend of Jeremy Taylor and of Cowley, the latter of whom addressed his 'Garden' to him. Evelyn was greatly attached to gardens and gardening, and had written much on the subject. Cowley addresses him in that felicitous prose none else ever wrote so well: "I know nobody that possesses more private happiness than you do in your garden; and yet no man who makes his happiness more public by a free communication of it to others. All that I myself am able yet to do, is only to recommend to mankind the search of that felicity, which you instruct them how to find and to enjoy.

> "Happy art thou whom God does bless
> With the full choice of thine own happiness."

Evelyn's wife was a very superior woman; his Diary bears abundant testimony to her many excellencies. Cowley makes a pleasant allusion to her in the lines



[Leatherhead Church.]

succeeding those above quoted: he reminds his friend that in his "virtuous wife" he has "pleasures more refined and sweet;

> "The fairest garden in her looks,
> And in her mind the wisest books."

There is a homely companionable vein in our older writers, quite delightful to meet with. But we have talked so long of Evelyn, we cannot stay to describe the house. Both it and the grounds possess many relics of its celebrated possessor.

Before we leave the neighbourhood of Dorking we must ascend its boasted eminence, Box Hill: so named from the number of box-trees that grow upon it: in old maps it is marked White Hill. Some years ago the box-trees then growing upon it were nearly all cut down, but there is a goodly plantation of them there now, and they appear very flourishing. The view from its summit is a most extensive one, there being little to interrupt it in any direction. You may trace the course of the Mole for miles from it. Over the downs towards Croydon is a rich and pleasing prospect; that on the south towards Sussex is more varied, and from the greater quantity of wood perhaps more attractive; while on the south-west Dorking lies at your feet, stretching away towards the wide valley formed by the Guildford downs and the range of hills of which Leith Hill is the most prominent. Sheltered by these hills and with the rich valley behind it, its appearance is unusually beautiful, as it is seen through the softening haze of the mid-day sun. As evening draws on, and the hills deepen into gloom, while the light blue smoke ascending from a thousand chimneys half conceals the town, and the sun is slowly sinking behind and gilding the ridge of distant hills, it is more sombre, but takes a firmer hold on the mind.

In the outset of our account we said that the Mole had received many notices from the poets for a quality it was only imagined to possess. We alluded to the fabulous account of its sinking into the earth and reappearing some miles farther on: as it was at the foot of Box Hill it was said to disappear, this seems to be the proper place to notice it. Camden says, "The Mole coming to White (*i. e.* Box) Hill hides itself, or is rather swallowed up, at the foot of the hill there; and for that reason the place is called the Swallow: but about two miles below it bubbles up and rises again; so that the inhabitants of this tract, no less than the Spaniards, may boast of having a bridge that feeds several flocks of sheep." Izaak Walton, who overlooked little that had been said about rivers, quotes this with some relish, and it is repeated by most of our older writers who have occasion to mention the Mole. Nor was the error soon removed from our descriptive works. We find it in Chamberlayne's 'Present State of Great Britain,' 1743. As might be expected, the poets gladly availed themselves of so poetical a circumstance; thus Milton, in one of his juvenile poems (that entitled 'At a Vacation Exercise in the College'), speaks of the

> "Sullen Mole, that runneth underneath;"

a line which Pope evidently copied in his 'Windsor Forest' (and D'Israeli might have given it a place among his 'Poetical Imitations')—he calls it the

> "Sullen Mole, that hides his diving flood."

Drayton, in that curious rhyming repertory of out-of-the-way local information, the 'Poly-Olbion' (Song 17, p. 265, &c., ed. 1622), has given a very fanciful account of the matter. He is describing the course of the Thames, and when he has brought him to Hampton, he says—

> "'Gainst Hampton-court he meets the soft and gentle Mole,"

and is a little inclined to dally awhile with her, which Thame and Isis, the parents of Thames, see with some displeasure, as they are anxious for him to hasten on to unite with Medway:—

> "But Tames would hardly on; oft turning back, to show
> From his much-loved Mole how loth he was to go.
> The Mother of the Mole, old Holmesdale, likewise bears
> The affection of her childe as ill as they do theirs."

She accordingly tries various ways to prevent their meeting; but Mole is not to be easily stayed; and at length

"Old Holmesdale raised hills to keep the straggler in,
That of her daughter's stay she need no more to doubt:
(Yet never was there help, but love could find it out).
Mole digs herself a path, by working day and night
(According to her name, to show her nature right),
And underneath the earth for three miles' space doth creep."

Yet, after all, Thames is forced on; although we are glad to find, a little lower, that something like poetical justice is rendered to our Mole: for when

"Tames did understand what pains the Mole did take"

for his behoof, he showed his sympathy, and in some measure endeavoured to requite her attachment; for

"Up towards the place, where first his much-loved Mole was seen,
He ever since doth flow towards delightful Sheen."

In a note to his account of the disappearance of the Mole, Drayton says, "The Mole runs into the earth about a mile from Darking in Surrey, and after some two miles sees the light again, which to be certain hath been affirmed by inhabitants thereabout reporting." And then proceeds to show by plenteous classical citations, that there are rivers in Greece and Sicily which flow underground in a similar manner. De Foe, in his 'Tour through Great Britain,' is said by Bray to have first pointed out the error of Camden. But he was wrong in denying the statement entirely; it seldom happens that these accounts, however exaggerated, are altogether without foundation. The statement of Mr. Bray, the editor of Manning's 'History of Surrey' (in vol. ii., pp. 649-666, &c. of that work), is to the effect that the Mole does not disappear at once and then burst forth at once; but in a dry summer, in various places between Burford-bridge, in Mickelham, and Thorncroft-bridge, it is absorbed and lost in the porous bed through which it runs, leaving in many places the naked gravel and in others forming a stagnant pool. Mr. Bray says he has often seen it dry at Burford-bridge, though in floods the river has nearly run over the bridge. There is no reason to suppose that it forms an underground current; there is, however, a spring by Thorncroft-bridge, at a small distance from the river, from which a constant stream issues and runs into it; there are also two hollows in Burford Park, in the bottom of which the current of the Mole may, it is said, be traced. A careful plan of the Mole from Box Hill to Leatherhead is given by Mr. Bray, in which the parts that become dry are shown, and the 'Swallows' between these places marked. A little below the places which become dry, other streams run into the bed of the river, and it appears to flow on as usual: these circumstances combined, no doubt gave rise to the report. There is some interest in tracing these "vulgar errors," and we hope our readers will not think we have dwelt too long on this.

Leaving Box Hill on our right, we soon reach Burford-bridge, of which mention is made above. The vale here is called Mickelham, and is one of the loveliest anywhere to be found. It would indeed be no easy thing to select a more beautiful ramble than that by the side of the Mole as it winds through this valley. The downs are close on either hand, and, although of no great height, afford prettily varied slopes, and are more wooded than the downs usually are. All along the valley there is a pleasing admixture of soft swelling downs and cultivated land, parks with magnificent trees and lordly mansions, happy-looking country-houses, so snugly wrapped up in their coatings of evergreens, yet so gay in their heaps of brilliant flowers, with one or two antique though rural churches, and many a picturesque cluster of cottages. Mr. Sharp (conversation Sharp, as he is called) had a 'Retreat' in Mickelham, and many a gathering of the most gifted men of the age occurred within its walls. Sir James Mackintosh, as we are informed in his Memoirs, used often, when in India, to speak with great delight of this, "The happy valley," as he was accustomed to designate it. Norbury Park, the seat of Mr W. Lock, the friend of Fuseli, so often referred to in Fuseli's Life, is in Mickelham. The Mole flows through its beautiful grounds: the house is a fine structure; its walls were painted by Barrett, the successful rival, in the estimation of his contemporaries, of Wilson, with views chiefly of the Lakes, but which appear to harmonize with the natural scenery by which they are surrounded. In the Park is an abundance of fine timber: formerly there is said to have been so many walnut-trees on the estate, as to have produced 100*l.* at a tything of 4*d.* a tree. They were nearly all cut down, however, by a Mr. Chapman, when he purchased the estate. Mickelham Church is evidently of great antiquity: it has a large square tower with double buttresses at the corners; at one side of the tower is a window with a round-headed archewith dentals, and in the body of the church are some others of curious form: but it is to be regretted that, at some reparation of the edifice, they have been so altered and painted, that it is not easy to tell how much of them is genuine. There are several interesting monuments about the church, and, altogether, it will repay examination. A little farther on, a neat school has just been erected on the hill-side; it is designed with a happy feeling (as an artist would say) for the capabilities of the situation, and will not fail to remind the traveller of the secluded kirk-houses on the fell-sides in the northern counties.

Although the Mole here runs pretty much through private grounds, it may be followed by the pedestrian, and is so beautiful all the way to Leatherhead, that it should not be left, or only to look at some places that may be passed. Here, as in Betchworth Park, it has many little islets; and the river, altogether, will recall the Thames in its pleasanter parts to the memory.

After leaving Norbury Park, we soon reach Thorncroft, and shortly descry the lofty tower of Leatherhead Church, with the irregular roofs of the town beyond it. Leatherhead Church is an ancient structure, having been rebuilt about 1346, when the present tower was added. It bears evident marks of having been built at various periods, being formed partly of brick, partly of a sandstone that is fast decaying, and partly of flints and rubble. It has a variety of projecting roofs and porches, that have been added to the original edifice as convenience rather than design suggested; the effect, however, is not the less picturesque for the absence of formality. The whole was modernized in 1701. The interior is very neat and clean in its appearance. It abounds with noticeable monuments both within and without.

Leatherhead is a quiet town; little appears to disturb it—the ostler at the Swan seems the only person moved even by the stage as it passes through its long street. It is situated on very irregular ground, and has therefore less stiffness than many country towns. It is a very old place, being mentioned in Domesday Book; yet although it bears evident traces of antiquity, there is little in it to attract attention—nor are there any buildings of historical interest, unless the Mansion-house in South-street may be said to possess it, which has the somewhat unenviable distinction of having been the residence of Judge Jeffries. His daughter died here; her burial is recorded in the parish register to have taken place on Dec. 2nd, 1688. But even Jeffries's house is not in its original condition: it was rebuilt in 1710. There is a public-house near the bridge that is supposed to be the same whose alewife is celebrated by the poet Skelton. The Mole at Leatherhead spreads out to a considerable width, and is crossed by an excellent bridge of fourteen arches, seven of them being in Fetcham parish. Leatherhead

trout are very famous, and the traveller who wishes to test their excellence may, if he be a brother of the angle, throw a line here—or mine hostess of the Swan will, in the proper season, supply those who may prefer the fish without the labour.

[To be continued.]

BALMS AND BALSAMS.

The word *balsam*, like many other words in common use, has a double signification. It is applied to a kind of garden-plant very common in this country, and it is also applied to a viscid juice or sap employed in the East for perfumery and for medical purposes. Nay, there is even a third mode of employing the word; for while the true balsam is a juice exuding from trees, there are also artificial balsams formed by mixing various ingredients into a paste or unctuous substance. The general character of a true or natural balsam is, that it is a fragrant, oily, viscid, inflammable juice, exuding from various trees and plants, insoluble in water, incapable of putrefaction, and exerting a preservative power over animal substances. This last-named property gave rise to the expression *embalming*, as applied to dead bodies undergoing the preservative process.

The *Balm of Gilead* (not the composition of Solomons, of Liverpool, which merely assumed the popular name) is one of the most noted of the balsams (for 'balm' and 'balsam' are indiscriminately applied to these substances). It is a resinous matter exuding from the bark of an Oriental tree found in Abyssinia and Arabia. There is one kind called *balm of Gilead*, and another called *balsam of Mecca*, between which some comparison has arisen, from ignorance whether or not they are identical; but for the purpose of general description we may deem them so. The plant producing this balm grows to a height of fourteen feet, flourishing in a hot climate and in a barren stony soil. The wood is white, light, and of open texture, covered with a smooth bark: this bark resembles in colour that of a standard cherry-tree, and emits a very fragrant odour. The leaves somewhat resemble those of rue, and the flowers those of the acacia. The fruit consists of small oval berries, containing a yellowish fluid similar to honey, and exhaling a perfume.

The balm flows from incisions in the tree, which are made with an axe during the months of July, August, and September, at a time when the sap is circulating with great activity. Each day's produce is received in small earthen bottles, and thence poured into one of larger dimensions; but the quantity obtained is very small, and its collection is tedious and troublesome, for the total exudation is usually but three or four drops in a day, nor does the most productive tree afford above sixty: this scarcity is one reason why the balm is sold at so high a price as it commands in the East. The odour soon after collection is strong and pungent, occasioning a sensation like that of volatile salts; its intensity decays, and indeed wholly disappears, if the balm be not carefully preserved. It has a rough, acid, pungent taste, and a light yellowish colour. It dissolves readily in water. It acquires a deeper tinge of yellow by time, and thickens to the consistence of honey. The high price of this substance leads to a system of adulteration on the part of those who sell it; oil of sesamum, turpentine, honey, wax, and other ingredients being mixed with it to increase its weight.

The balm obtained from the plant in the above manner is called *opobalsamum*; but the same plant yields two other forms of the substance, one called *carpobalsamum*, prepared by expressing a pungent and odorous juice from the fruit, and another, called *xylobalsamum*, prepared from a decoction of the twigs. These twigs are collected in small faggots and sent to Venice.

The balm of Gilead, or Mecca balsam, has been at various times and in various countries recommended as a cure for almost all the "ills that flesh is heir to." Some have applied it as a vulnerary, to cure wounds; some as a stomachic; some for fevers; others for rheumatism. As an antiseptic it has been celebrated from very early times, and is for that reason employed in embalming. When the plague makes its appearance in Egypt, those who can afford so costly an antidote take a small quantity of the balm daily. Its principal use in the East, however, is as a cosmetic by the ladies of rank. After a warm bath, the face and other parts of the person are anointed with the balsam; and the same process is continued every third day during a month. Oil of almonds and other cosmetics are then rubbed over the skin, to give the finishing bloom for which the balm was a preparative. Lady Mary Wortley Montague tried some of this balm on her face; she paid a price for it by three days' pain and irritation to which it subjected her, but found that it gave to the complexion an artificial bloom for which the ladies of Constantinople prized it.

Capivi Balsam, or *Balsam of Copaiba*, is another of the natural balsams procured from plants. This is obtained from the *Copaifera officinalis*, a tall and elegant tree, growing in Brazil and several other parts of South America. To procure the balsam, several incisions, formed sometimes with an auger, are made in the tree near the ground, penetrating through the bark into the substance of the wood; the balsam flows out of these holes in such abundance, that sometimes, in three hours, twelve pounds have been obtained. The balsam is colourless when flowing from the tree; after awhile it becomes of an amber colour, and considerably viscid, but retains its transparency. The smell is fragrant and powerful; the taste is bitter, heating, and aromatic, and it stains paper in the same manner as oil. It is almost insoluble in water; but it may be dissolved in fixed and volatile oils, and in spirits of wine. With the latter liquid it makes a strong penetrating tincture. It may be separated by distillation into two component ingredients; an insipid resin, and a highly fragrant oil, the latter retaining all the essential properties of the original balsam.

The capivi balsam has considerable medicinal value; though, as in many other cases, they have been exaggerated. Many distressing diseases are alleviated, if not cured, by its agency; and it appears to be an important item in the Pharmacopœia.

The *Balsam of Peru* is a third variety, belonging more or less closely to the other two. It is a gummy liquid which exudes from the *Myroxylon Peruvianum*, a large tree growing in Peru, Mexico, Brazil, and other parts of South America. The ancient Mexican kings are said to have cultivated this tree in their gardens for the sake of the balsam, which flows from the bark whenever the latter is wounded, especially at the end of the rainy season. It exudes very sparingly, and soon concretes into a fragrant brittle resin. There are two kinds, the black and the white, the latter of which is more valuable and fragrant than the former. The common sort is of a dark colour approaching to black; the smell highly fragrant; the taste aromatic, rather bitter, and very acrid; and the consistence always thick and viscid—the white variety assuming a more solid form. It is scarcely soluble in water, but completely so in spirits of wine, and yields on distillation a fragrant reddish oil. Peruvian balsam is extensively employed in medicine as a stimulant, both internally and externally. A tincture is made by dissolving the balsam in spirits of wine, and it enters into several of the artificial or compound balsamic pre-

parations. It is frequently given in the form of an emulsion mixed with water and white of egg.

The *Balsam of Tolu* is another variety. This is the product of the *Toluifera balsamum*, a tree growing in the province of Tolu in South America. The balsam is obtained, as in the other instances, by making incisions in the bark of the trees. It is of a reddish yellow colour and pellucid; its consistence when fresh is extremely tenacious, but by age it becomes brittle. In hot weather pieces of the balsam have a tendency to coalesce and adhere to the bottom of any vessel in which they are kept. It yields an extremely fragrant and grateful smell, but only a slight taste. It readily imparts its flavour to watery liquids, though almost insoluble in them. Eight ounces of this balsam boiled in three pints of water make a very fragrant decoction, used in this country for medicinal purposes. A tincture is also prepared by dissolving an ounce and a half of the balsam in a pint of rectified spirits of wine. When this balsam is burned, it yields a remarkably aromatic penetrating smoke; and on this account it was often an ingredient in those fumigations which were formerly so much employed with a view either of purifying an infected atmosphere or of diffusing a grateful perfume. It is used in medicine chiefly as a stimulant.

There are the *balsamum rachasira*, the *balsamum Carpathicum*, the *balsamum Canadense*, and others, which partake of the general character of those above described; all being produced by exudation from the trunks of trees, and all being more or less aromatic and stimulant. There is another, more important than these, called *storax*. This is a resinous drug, obtained in greatest perfection from trees growing in Asiatic Turkey. It issues in the fluid state from incisions made in the bark of the trunk or branches. It has a most pleasing fragrant ordour. Two kinds of this balsam or resin have been commonly distinguished in the shops, viz. the *pure* and the *common* storax. The first of these is usually obtained in irregular compact masses, free from impurities, of a yellowish or reddish brown appearance, and interspersed with whitish drops. It is extremely fragrant, and melts readily. The masses generally are termed 'storax in the lump,' while the whitish drops or tears are called 'storax in the tear.' The common storax is imported in large masses, very light, and bears but little external resemblance to the purer; it is, in fact, composed of dirty sawdust mixed up with the resinous matter. Common storax, infused in water, imparts to the menstruum a good yellow colour, a slight odour, and a slight balsamic taste. Among some of the ancients, storax was a familiar remedy in catarrhs, coughs, asthmas, and other complaints. The name of *storax*, or *liquid storax*, has also been applied to an exudation from a North American tree; it is obtained from incisions made in the trunk; while a liquid called *liquidambar* is obtained by boiling the bark or branches in water. The liquid storax used formerly to be much used for external applications, but it has fallen into comparative disuse.

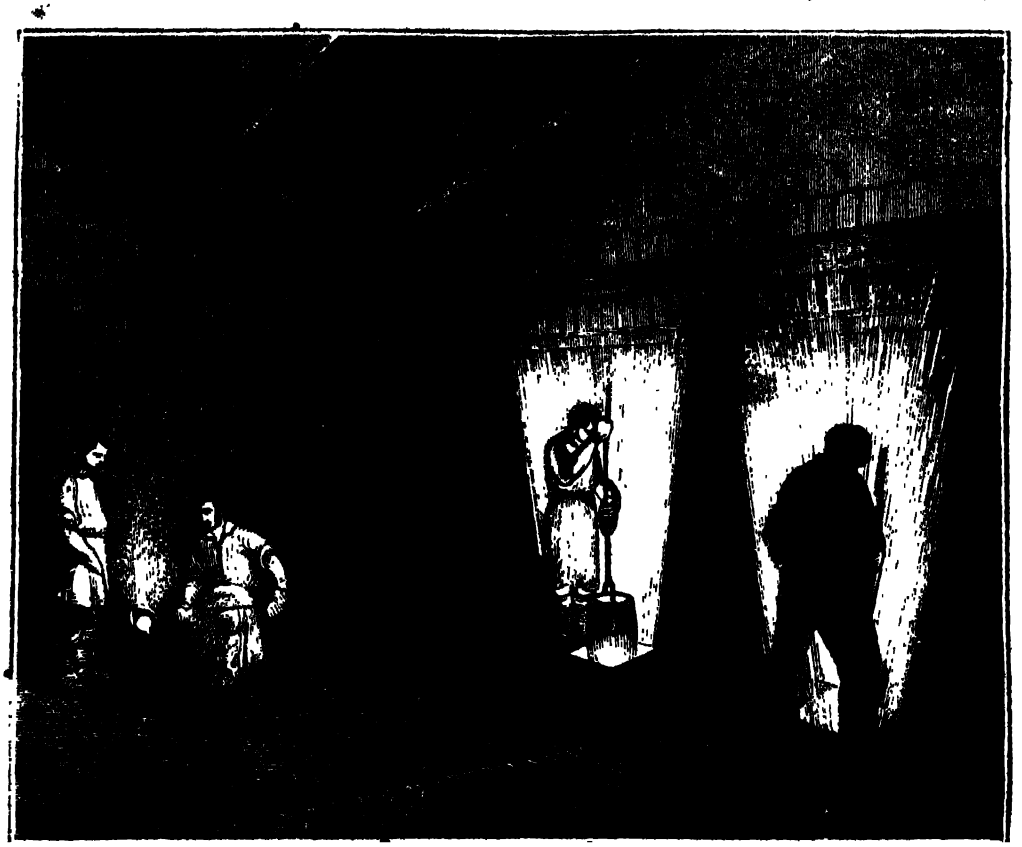
Artificial balms or balsams are numerous, and are either avowed imitations of the natural products or asserted to possess similar qualities. *Friar's balsam*, or *Jesuit's drops*, and the *Balsamum Vitæ*, or "Balsam of Life," introduced by Hoffman, are among the most noted of them; but of these compounds it is not our purpose to treat.

It has been remarked with respect to the medicinal use of all these kinds of balsam:—"Of all the properties which have been attributed to the internal use of balsams, none is more ancient and commonly prevalent than that of *healing* or *vulnerary*." This idea appears to have arisen from the observations of their use when externally applied to a recent wound. If a gash is made in the hand with a clean cutting knife, and the parts are brought together and bound up with a rag dipped in any balsam, and left undisturbed for some days, it is matter of common remark that the wound will generally heal without any suppuration, by simple adhesion of the divided parts.

The Fair at Reval.—The Jahrmarkt, or annual fair, is now going forward in Reval. This is held in a most picturesque spot, beneath the old elm-trees before the church of St. Nicholas; the low wide-roofed booths surmounted with their different insignia, with wares of all colours floating around them, and merchants of all complexions swarming before them, while the venerable trees and time-worn edifice look down in sober grandeur on all this short-lived bloom. In old times, every merchant of any consideration in Reval removed to his booth in the fair, and old customers were welcomed to old goods; and though the one was not less dear, nor the other less difficult, yet both buyer and seller equally enjoyed the gaiety of the time, and were satisfied with this social gain. But now Reval mankind is becoming soberer, and by tacit consent it has been agreed that as no superiority in the goods nor accession in the demand accompanies this change of place, it is as well to leave the merchandise in its place on the counter, instead of flaunting it forth beneath the old trees in the church-yard. The Jahrmarkt is therefore gradually being abandoned to the travelling merchants from countries widely severed, who peregrinate from one mart to another, and, save the same sovereign, own no social element or bond in common. Here were Russians with their Siberian furs, and Bulgarians with their Turkish clothes, and Tula merchants with their cutlery—all infinitely more interesting to the foreigner than the wares they displayed. And before his booth lolled the sleepy Tartar, with flat face and high cheek-bones, and little eyes which opened and shut on his customers with a languor and expression often absent from orbs of twice the dimensions—and beside him paced the grave Armenian, with long nose and high peaked forehead, and searching glance—neither comprehending the other, and both accosting me in Russian scarce superior to mine own. "Whence does the *Sudarina* come?" "*Iz Anglichanka*," "I am an Englishwoman," I replied; an avowal abroad, like that of a patrician name at home, never otherwise than agreeable to make, and, thinking to increase his respect, added, "and my home is two thousand wersts off." "*Eto nichavo*," "That's nothing," said the Armenian, with a smile not unmixed with disdain; "my wife and children live six thousand wersts hence." Nor is this by any means an extreme case—the Petersburg post penetrates to inland homes fourteen thousand wersts removed from the monarch's residence.—*Letters from the Baltic.*

Mines of Potosi.—The mountain of Potosi, when viewed from the city heights, with the hill in its front, called the Younger Potosi, enclosed to the eye within the circumference of the great cone without, is in shape like an extended tent, and if the mind of the observer can separate the sum of moral evil it has inflicted on the world from the bare view, no sterile object in nature can be more truly magnificent. Leaving out of the question its conformation, the numerous metalliferous tints with which the cone is patched and coloured, green, orange, yellow, grey, and rose-colour, according to the hues of the ores which have been scattered from the mouths of the mines, are singular and beautiful in effect. The number of the mines is reckoned by some Spaniards at five thousand. This is an exaggeration at first appearance, but it must be understood by the reader that it refers to portions of mines called 'Estacas,' or individual shares, consisting of so many square 'varas' (yards or feet) which each proprietor holds by virtue of what is called 'denouncement,' as prescribed in the old Spanish code, or "laws of the mines." Whatever may have been the quantity of these Estacas once at work, not more than a hundred were in activity when I was at Potosi, and probably not one half that number until General Miller became the governor, when affairs began to wear a brighter aspect, and the country to recover a little from its distresses. This was seen to be the case in all the different branches of employ. Previous to the Revolution the river before alluded to turned the barbarously constructed machinery of ninety 'ingenios,' or stamping-mills, for breaking the ores.—*Captain Andrews's Journey from Buenos Ayres to Potosi.*

A DAY AT THE FITZALAN STEEL AND FILE-WORKS, SHEFFIELD.



[Steel Casting - Furnaces, Crucibles, Mould, In

"From what country and in what form is *steel* procured?" We should probably be correct in surmising that this question has occurred to many who are familiar enough with the appearance and the use of steel. Whether this valuable metal is a simple substance, forming narrow veins in hard rock; whether it occupies thick layers or beds beneath the earth's surface, like coal and rock-salt; whether it is found in rounded lumps or crude masses, scattered irregularly in mining districts; whether it is formed chemically from a mixture of several different substances, by the aid of heat and liquefaction, and with all the appliances of retorts, crucibles, and furnaces; whether it contains iron, or *is* iron, and how (if it be iron) the change from one form to the other is brought about; whether there are any steel-mines, and, if so, where they are situated—all these are points which are by no means so generally understood as they deserve to be; and it will not be a misappropriation of time if we devote a "Day" to the subject.

Steel is a combination of iron and carbon. Black-lead, of which drawing-pencils are made, is also composed principally of iron and carbon. Cast-iron, too, is a compound containing pure iron and carbon. The striking differences between these three substances arise in a twofold manner:—from the relative proportion between the two ingredients, and from the manner in which the union is brought about. Thus, malleable iron, such as is formed into bars and wire, contains a very little carbon; steel contains rather more; cast-iron contains a variable quantity according to the purposes to which it is to be applied, but always a greater proportion than steel and a less proportion than plumbago (or, as it is misnamed, "black-lead"). A mere difference in the relative proportion of the two ingredients, therefore, will not suffice to explain the difference between iron and steel. Steel, in its composition, occupies a middle place between malleable iron and cast-iron; but its qualities are very different from either, and these qualities appear to be due to the manner in which the two ingredients combine. Sometimes the combination presents a granulated texture, sometimes fibrous, sometimes crystalline, sometimes smooth and glittering, at other times rough and dull. Even scientific and practical men best qualified to master the subject have not yet shown why and how these changes take place; and it will therefore be out of place for us here to attempt any minute explanation. It will suffice for the present object to state the matter thus—that all our steel is made from bar-iron, which iron had been previously made from the ore by the processes of smelting, forging, &c., as described in our last Supplement; that the change from iron to steel is brought about by a long and careful series of processes, in the course of which carbon is absorbed by the iron; and that the steel so produced derives different qualities according to the subsequent processes which it undergoes.

It may appear strange, and indeed has about it something very remarkable, that notwithstanding the immensity of our iron manufacture, all our finest steel is made from iron brought from abroad; that this iron is procured from one single district, brought to one single English port, and consigned to the hands of one single firm. There appears reason to believe that this will not continue to be the case to so great an extent as it has been; but it is at present sufficiently near the truth to require at the outset a little explanation.

There is among the iron-mines of Sweden one which yields iron better fitted for making steel than any other yet discovered, at least in an available form; and English steel-makers have found this iron so valuable for their purpose, that they have been content to give a very high price for it, rather than employ English iron. The iron-mines of Sweden, taken collectively, are governed in a peculiar manner, which imparts the character of a very strict monopoly to the sale of Swedish iron in England. Each forge has its particular mark stamped on the bars of iron it produces, which is correctly copied into a register, with the name of the place where the establishment is situated—the names of the proprietors of the work—the commissioner or agent for the sale of iron—the assortment each makes, and to what country it is generally shipped—the quantity annually made by each work—the quantity which each work delivers to the government (which is about one per cent. on the quantity of the iron produced)—the determination of the quality of the iron of each work—the place and province in which the works are situated—the place from whence the iron is generally shipped—and how many forge-hammers there are at each work.

Among the mines thus regulated is that of Dannemora, which supplies England with iron for making steel. It is situated about thirty miles from Upsala, and has now been worked for nearly four centuries without failing in the abundance of its rich supply. The mine first belonged to the King of Sweden, then to the Archbishop of Upsala; but now it belongs to several private individuals, who work it separately on their own account. The ore differs in quality in different parts of the mine; some yielding 25 per cent. of cast-iron, and some as much as 75 per cent. The ore is blasted with gunpowder, and, after being broken in small pieces, is roasted. The smelting is effected in conical-shaped furnaces; the fuel employed being charcoal. The cast or 'pig' iron obtained is as white as silver, completely crystallized, and very brittle; and to convert this into malleable iron, it is heated in a bed of charcoal, and hammered out into bars, which are found to have a fibrous texture and a very tough quality. "The quantity of iron which this mine yields every year," says Mr. Scrivenor, from whose interesting 'History of the Iron Trade' these details are chiefly taken, "amounts to about four thousand tons; the whole of it is sent to England, to the house of Messrs. Sykes of Hull, where it is known by the name of Oregrund iron, taking its name from the port at which it is shipped. The first or best marks are 'hoop-L,' which sells at 40*l.* a ton, and OOCL, which sells at 39*l.* a ton; while the best Russian mark, the CCND, seldom fetches a higher price than 20*l.* a ton. The cause of the superiority of the Dannemora iron has never been explained. Some chemists ascribe it to the presence of manganese: Berzelius attributed it to the presence of the metal of silica: while others suppose it to arise from the nature of the process employed."

There is allusion above to 'marks,' which may need a little explanation. Each kind of iron has a reputation of its own, great or small, as the case may be; and the more highly it is esteemed, the more earnest are the makers in wishing that no other should be mistaken for it. Hence has arisen the custom of stamping some symbol on the end of each bar, by which the quality of the metal shall be known. Thus, C C N D is the symbol of the Russian iron brought from the mines of Prince Demidoff, a quality highly valued for many purposes; 'hoop-L' (that is, a letter L encompassed by a hoop) is the still more celebrated and valued Swedish Oregrund iron: while others are designated the 'double bullet,' the 'gridiron,' the 'steinbuck,' the 'C and Crown,' &c., according to the symbol stamped upon the bars.

We have found, then, that English steel is to a great degree made from foreign iron, brought to the port of Hull; and we have to trace it from thence. Some small portion goes to London, some to Newcastle, some to Birmingham; but all these are fragmentary and trifling compared with what goes to Sheffield. Here we find the centre of the steel trade, ramifying into a multiplicity of branches almost endless. Sheffield is as completely the metropolis of steel as Manchester is of cotton or Leeds of woollens. There is not a corner of the world where a British ship is allowed to enter but could exhibit some specimens or other of Sheffield steel goods. The rivers of Sheffield, if they could speak, would tell how busily they are employed in setting in motion the machinery for bringing steel to some one or other of its numerous forms; while the thoughts of the inhabitants, the names of many of the streets, the arrangement of the buildings, and the corporate usages of the town—all point to steel as being indeed a precious metal to Sheffield.

There are in this busy town several large establishments called Steel-Works, where the bar-iron is converted into steel and brought to a form fitted for the numerous workers in that metal. Some of these, according to the technical phraseology of the town, are 'tilts,' some are 'mills,' some are 'converting-works,' while a few comprise all the varieties within themselves. To understand this, it will be necessary to remark that manufactures are extremely subdivided at Sheffield, as at Birmingham; skill in one branch or sub-branch of manufacture having been deemed a sufficient reason for confining attention thereto, to the exclusion of others.

The cutlery trade generally of Sheffield will not come under our notice in the present article, else we should have to speak of this subdivision more fully; but it will be sufficient, in reference to steel, to state that some works or manufacturers are wholly occupied in *converting*, or making the crudest form of steel; others in *tilting*, or giving a further development to the steel; others in *casting*, or giving to steel a still higher quality by pouring it into ingots or moulds in a liquid state; and others in *rolling* or *rolling*, whereby the steel is brought into the form either of bars or of sheets; while in some few cases the converting, the tilting, the casting, and the rolling are all carried on in one establishment.

Among the Works last alluded to, we have been favoured with access to the *Fitzalan Steel-Works* of Messrs. Marriott and Atkinson, which, besides exhibiting the various processes of steel-making, are well fitted to illustrate our subject, inasmuch as the *file manufacture* (one of the most important in which steel is employed) is there conducted on a large scale.

These Works are situated at Attercliffe, an eastern suburb of Sheffield. The whole neighbourhood is singularly favoured as to facilities for manufactures. Sheffield is in a hollow, nearly surrounded by hills; and several small rivers flow between these hills into the hollow, thus affording moving-power for a large number of water-wheels. Attercliffe is situated at a part of the district where all these streams have become one, and where also a canal opens a communica-

tion between Sheffield and the port of Hull, so that there is both motive-power and transit-power at command.

The Fitzalan Works occupy a quadrangular space surrounded by buildings, on the north bank of the Sheffield Canal. When within the entrance-gates we find a quadrangle having a large tank or reservoir near the centre, and around it are the various workshops for conducting the manufacturing processes. On the right hand are the 'converting' furnaces, where the iron is first made to assume the form of steel; opposite are the 'tilting' and 'shearing' houses, the 'rolling mill,' the 'casting-house,' the 'engine-house,' and other buildings pertaining more or less to the manufacture; on the left are the 'file-forges,' where pieces of steel are brought into the rough form for files; while on the north or entrance side of the quadrangle are ranges of shops in which these pieces go through the numerous stages of progress incidental to the production of a file. Southward of the group of buildings is a wharf on the banks of the canal, where barges bring the iron from Hull and other places, and whence the finished goods are dispatched by similar conveyance. On the opposite banks of the canal are little patches of garden-ground, held by the proprietors of the Works, and let out to their workmen on the allotment system;—a plan now acted on in many manufacturing towns, and always with good results; for it gives to the workmen a healthy occupation during a few leisure hours, and at the same time cements the connection between them and their employers.

The arrangements of the various buildings depend on the nature of the processes carried on, and these therefore we will proceed to notice in the order in which they naturally occur. The making and perfecting of steel form the main or general object, while the fabrication of this steel into files constitutes one application of the material, afterwards to be noticed.

The 'converting-furnaces' are the scene of the first stage in steel-making. The object in view is to saturate iron bars with carbon to such an extent as to change their quality from iron to steel. The bars so saturated are of various widths, and are partly Swedish and partly English, according to the purposes to which the steel is to be applied. These bars, when adjusted to convenient lengths, are packed or piled up in the converting-furnaces in a singular manner. Each converting-furnace, viewed outwardly, has somewhat the shape of a glass-house, being a sort of conical covering to an oven of very large size. The oven contains two oblong receptacles or troughs, each measuring nearly twenty feet in length, about a yard deep and the same in width. They are so placed with respect to each other, that a strong body of flame may play around both of them, and raise to a high heat whatever may be placed in them.

On the bottom of each trough is placed a layer of coarsely powdered charcoal; then a layer of iron bars, placed side by side, as many as the width will admit; then another layer of charcoal; then a layer of iron bars; and so on till the trough is filled, at which time it contains more than thirty alternations of iron and charcoal. The surface is covered with a clayey substance called *wheelswarf*, derived from the abrasion or wear of the numerous grindstones used at Sheffield, made into a kind of cement or putty. A fire is kindled with Sheffield coal (which is found to be excellently adapted for this purpose), and kept up fiercely for many days. During this time the iron is in a red-hot or perhaps a white-hot state; the charcoal is also highly heated; and the iron seems gradually to absorb a portion of charcoal into the very heart of the bar. The coating of wheelswarf prevents the charcoal from burning away, and thereby leaves it in a condition to act upon the iron. One of the bars is so placed in the trough that it can be drawn out occasionally without disturbing the others; and from the inspection of this bar the workman tests the progress of the operation. Steel for coach-springs requires less of this action, or a 'lower degree of conversion,' and is therefore exposed to a lower heat than any other; steel for numerous common articles of manufacture requires a higher conversion; steel which is afterwards to be 'sheared' or hammered for knife-blades and other purposes, still higher; steel for files requires a yet higher degree of conversion; and steel which is afterwards to be cast in a fluid state requires the highest of all. The business of the steel-converter, therefore, is one of some nicety, demanding the exercise of care and judgment.

We have said that it is one of the peculiarities of Sheffield to subdivide the several stages in manufacture, and to appropriate each stage to one set of manufacturers. This system may be illustrated by the case now under notice. There are many manufacturers in Sheffield who keep converting-furnaces only; they receive the iron in bars, pass these bars through the process of conversion, and then their department is ended. The Works which we are describing, being among the few that exhibit the successive stages, are very convenient for our object; but to get an idea of the general character of Sheffield industry, it will be necessary to bear in mind that the operations of the converting-furnace are considered to be one branch of manufacture, distinct from and not necessarily associated with others.

The bars of iron when removed from the converting-furnace are in that state which procures for them the name of *blister-steel*. They have absorbed only about one per cent. of carbon, yet their quality is greatly changed. The steel, in this form, is not regarded as a material for manufactures, except for coarse goods; it is carried to a further stage before it has the necessary compactness and completeness for use in finer work, since the blisters, even if no other defects existed, would unfit it for all but coarse purposes. It obtains the name of *common steel* when, after being again heated, it is hammered with a very ponderous hammer, whereby a tougher quality is imparted to it. The most customary process to which it is next subjected is *shearing*—a name worthy to be classed among those which illustrate the odd nomenclature of manufactures. When we see 'shear-steel' stamped on table-knives, we may not inaptly imagine that it is steel which has been cut with a pair of shears; but the connection is more remote. This steel, soon after its introduction, being found suitable for making shears, it obtained the name of *shear-steel;* and by another step in the same road, the process came at length to be called *shearing*—a name about as consistent as it would be to apply the term *shoeing* to the process of tanning a calf-skin, on the ground that it makes leather fit for shoes.

The process of shearing steel is somewhat analogous to the welding of iron. It consists in heating several pieces, and hammering them one upon another, until all form one mass, greatly more dense, compact, and tough than the blister-steel from which it was made. This department of the manufacture introduces us to a part of the Works where some new features of arrangement demand our notice. The *tilt-house* or the *shear-house* is a building constructed with especial reference to strength and resistance of vibration. On entering this building we see on the left hand furnaces for bringing the pieces of blister-steel to a proper heat for welding or shearing; while before us are three hammers of enormous size and remarkable construction. The centre one of these hammers is the shear-hammer, employed in the operation now under notice; while



[Shear and Tilt Hammers.]

the other two are tilt-hammers, for a process which will be noticed further on. Each hammer consists of a mass of iron with a steel face, fixed at the end of a ponderous mass of wood bound with iron hoops; and all these three handles are connected with a revolving shaft or drum worked by a steam-engine. There is mechanism attached to this end, whereby the huge hammer is worked up and down with great rapidity, much in the same way as hammers are used by hand. So far the arrangements seem clear enough; but it is not until we consider the vibratory and shaking action of a hammer weighing twenty cwt. in rapid motion, that we can rightly understand the necessity for enormous strength in the building. Any ordinary structure would be shaken to pieces under this visitation; and hence a foundation has to be laid to a surprising depth, to prevent this result. In the first place the drum or revolving shaft for the three hammers weighs thirty-six tons, and the bearings for this rest upon a mass of stone-work twenty feet deep, formed of ten cubical stones weighing seven tons each. Then, as the anvil or flat mass of steel on which the blows of each hammer fall, must bear up against this immense concussion, it is placed on a mass of stone weighing seven tons, and this again is supported by a tree or a trunk of timber thrust upright many yards deep in the ground, and bound round with iron hoops. Altogether, therefore, there is a vast deal of underground work to fit this tilt-house for the purposes to which it is applied.

In this building, then, the steel is sheared and tilted. The bars of blister-steel are broken up into pieces about a foot long. These are heated in a furnace or forge, and when at a white heat they are brought under the operation of the large tilt-hammer, by which they are beaten out to thirty inches in length. To change these pieces into shear-steel, half a dozen of them are put one upon another in a pile, and fixed firmly at one end in a groove or long handle. The group thus connected is placed in a furnace to 'soak,' according to a technical phrase, that is, to be partially heated, preparatory to a more intense heating. The group is taken out of this first furnace, and transferred to another, where a fierce fire brings it to a white heat. The workman attends carefully to the state of the steel while in the furnace, as great nicety is required in the degree and equalization of the heat attained. When sufficiently heated, the group (still held by the handle) is taken out of the fire and placed under the largest or shear-hammer, where it is beaten on all four sides until all the pieces become thoroughly amalgamated or welded one to another, and the result appears in the form of a bar of steel two or three inches square. Each hammer has a kind of blast-pipe, to blow dust and dirt from the anvil beneath. In some cases the bar is cut in two, heated again, and again welded, whereby the process is carried still further. According to the degree to which it is welded or sheared, the steel is called 'double-shear,' 'single-shear,' or 'half-shear.' During the heating in the furnace, preparatory to the hammering, the group of pieces requires a degree of attention whereby the workman is exposed to a very intense heat.

The shear-steel made by this process, when closely examined, is found to have lost all the flaws and blisters which distinguished it as blister-steel, to have acquired a uniformity of character throughout, and to be greatly more malleable and tenacious than it was before.

There is, however, yet to be described a kind of steel more important than either of those hitherto described, and one to which the beauty of modern steel goods is in great part indebted: we allude to *cast-steel*. As the heat employed in melting steel is the greatest which the manufacturing arts of any country exhibit, the furnaces, the crucibles, and all the apparatus employed must be so formed as to endure this heat; and we must therefore notice these appliances before we can understand the process itself.

The crucibles or melting-pots are rather less than

two feet in height, and have a somewhat sugar-loaf shape. They are made of Stourbridge clay, wrought to the greatest possible degree of uniformity and smoothness. To give this uniformity, the clay, after being mixed with water and well worked up, is spread out in a thin layer on the floor of a room under the casting-house. Two men, with naked feet, tread or trample on the clay uninterruptedly for five or six hours,—walking, or jumping, or dancing, or shuffling



(for it is hard to know which to call it) over and over again from side to side, and from end to end, until every particle of clay has been trodden repeatedly. It might seem strange why some kind of mill should not be employed in this operation; but those who are most likely to understand the matter state that no other method equals this for bringing the clay to a perfect uniformity of substance, and expelling all air-bubbles. When the clay is prepared, it is made into crucibles weighing about twenty-six pounds each, by fashioning it in a mould having a core to give the internal form. The crucibles, as they are made, are placed in a vault where both air and warmth can come to them; and when dried by this means, they are placed, on the night before they are to be used, on an annealing grate, where they are covered with cinders, and allowed to remain till the next day. These operations of crucible-making are continued uninterruptedly; for notwithstanding the care and trouble bestowed, each crucible will only last one day. At these Works about a hundred and fifty are made and worn out every week.

The cast-house consists of two rooms or compartments, both paved with stone, and each containing six melting-furnaces. These furnaces are very different from others which we have had to mention: for they exhibit to the eye nothing but a hole in the floor about eighteen inches square. There are six of these holes in a row in each shop; and so long as they are covered by iron covers or lids, there is nothing particular to be seen; but when one of these lids is removed a fearfully intense heat is shot upwards from beneath. Each hole is the mouth of a furnace; and each furnace is a cell measuring about four feet deep by eighteen inches square, being merely large enough to contain two crucibles with the requisite quantity of fuel. There is a grate beneath, through which a powerful draught ascends to the fuel; and there is a flue at one end to carry off the smoke and heated gases. Neither bellows nor blast-engine is used; the intense heat being wholly excited and maintained by the judicious admission of air from a vaulted chamber beneath. The walls of these small furnaces are exposed to such a destructive temperature, that the selection of the material with which they are lined becomes a matter of much importance. This material obtains the name of *ganister*. It is a kind of stone found near Sheffield, and is used in the first instance as road-metal; after which, when ground to dust by wheels and horses' feet, it is collected and made into a plaster or lining for the furnaces.

Let us now see what passes in one of these cast-houses. Each crucible-full of metal requires about four hours to effect its perfect fusion; and there are three successive meltings in twelve hours. Each furnace is supplied with coke to a certain height; and the two pots or crucibles are adjusted within it, side by side. More coke is then thrown in, until both pots are entirely surrounded by it. Here they are left to be acted upon by the fire, until they are brought to a dazzling white heat. The cover of the furnace is opened, and a long funnel made of sheet-iron is let down into each pot, having its open end at a convenient height above. The steel, broken up into small fragments, and amounting to thirty or forty pounds for each pot, is thrown into the funnel, and allowed to fall down into the pot. The funnel is then removed, the cover put upon the pot, coke added so as to enclose it completely, and the lid of the furnace put on. From time to time, during the ensuing period of four hours, the lid is removed, and the progress of the melting watched, more and more coke being added when necessary; so that ultimately there are from four to five tons of coke used in melting one ton of steel.

As the time approaches for the casting, the men make preparations which sufficiently indicate the sort of "Fire-King" ordeal to which they are about to be exposed. They cover their legs and body with coarse sacking or leather, saturated with water from a trough at hand, and prepare to fill the ingot-moulds with the melted steel. These moulds are formed of metal, so shaped as to give oblong bars or ingots weighing from thirty-six pounds to two hundred pounds each, according to circumstances. Each mould is divided into two halves, which halves are bound closely together when the casting is about to take place. The mould is first coated on the inside with a kind of oily composition, closed up tightly, and placed vertically in a hole in the stone floor of the cast-house, with the upper end open. One of the men draws off the lid of a furnace, and the white-hot coke is removed from about the pot which is about to be emptied. A man then takes a long instrument acting like pincers or tongs, hovers over the furnace in a manner which is almost fearful for a spectator to witness, puts the tongs down into the furnace, grasps one of the pots firmly, and draws it up; having during this time his face directly over a furnace so intensely heated as to convert steel into a liquid, and drawing up, in this hazardous position, a white-hot crucible weighing with its contents sixty pounds. He rests the glowing mass with its lower end on the floor; another man strikes off some of the adhering slag with a long iron bar; a third man grasps the crucible with an instrument held horizontally; the first man loosens his hold, and with his tongs takes off the cover of the the crucible; the third man lifts up the mass (no trifling weight when held horizontally at the end of a bar), goes to the ingot-mould, and pours the liquid

steel into it; while a fourth man, standing before him, clears the liquid stream from any impurities as it flows, by means of a long rod. Thus all four have their prescribed office; and no description can give an adequate idea of the scene which is presented. The terrible yawning mouth over which the first man hovers, the glowing mass which he draws forth, the intense whiteness of the liquid steel as it flows into the mould, the profusion of delicate greenish sparks which shoot forth during the pouring—all form a spectacle which, when once seen, will not be soon forgotten.

The part of this operation which exposes the workman to the greatest heat is that of drawing the pot from the furnace; but the part requiring most skill is that of 'teeming,' or pouring into the mould, since it is necessary that the liquid stream should fall directly down the centre of the mould, without striking against the sides more than can be avoided. The eyes of the men are weakened by the intense glare to which they are exposed, but it does not appear that the general health suffers in any marked degree: yet a stranger may well marvel how any human frame could bear such a trial for years together.*

Immediately after each pot is emptied, it is returned again to the furnace, again brought to a white heat, again filled with pieces of steel, and again exposed to four hours' heating. After this has occurred three times, or one entire day, the melting-pot has rendered its services, and is then cast aside to be replaced by another. With regard to the steel thus melted, certain important changes have taken place within the last few years. It has often been conjectured that the Swedish iron derives some of its valuable properties from the presence of a small quantity of manganese; and within the last few years manganese has been introduced as a material to be added to the bar-steel in the melting-pot, in order to impart to the cast-steel certain valuable qualties which it did not possess before this improvement was introduced—such as a facility for being worked up into certain articles of cutlery. The history of the invention is rather complicated, and involves some of those unpleasant features of which our patent-laws exhibit too many examples. The invention was, we believe, placed in a practical form and patented by a Mr. Heath; but through certain technical flaws in the specification, the method has become thrown open to all: Sheffield has been greatly benefited, but the inventor has not. There is now a large quantity of carburet of manganese used weekly by the steel-melters of Sheffield; and the use of cast-steel for table-knives and other articles of cutlery has been one of the results of the invention. The matter is not one for discussion here; but it seems a pity that an invention which benefits a whole town should not benefit the inventor.

If the cast-steel is for the purpose of making saws, the ingots are rather flat, so as to be conveniently rolled into sheets at the rolling-mill; but if for other purposes, they are generally about as thick as they are wide. The rolling of steel into sheets or into bars is so precisely analogous to that observable in the iron-manufacture, that the same description suffices for both. The rolls are very ponderous, weighing as much as five hundred pounds each; and when they are about to be used, the steel, whether 'shear' or 'cast,' is heated in an adjoining furnace, and passed repeatedly between the rolls while yet red-hot, by which it assumes the form either of bars of any required shape or of sheets.

* To illustrate the dangers of the occupation, we may state that the man represented in the act of 'teeming,' in our frontispiece, has, since the sketch was taken, nearly lost his eye-sight, from a sudden shower of sparks occasioned by a too great dampness of the mould into which he was pouring the liquid steel.

The *tilting* of steel is another curious process, the object of which is to close the pores of the steel, and to render it as dense and compact as possible. All steel for the best articles is tilted before being applied to use, whether it be 'shear' or 'cast.' The tilting is one of the operations carried on in the building described in a former paragraph as being constructed with such great strength. There are two swings or suspended cradles in the tilt-house, one near each tilt-hammer. In these swings the men sit while holding the bars of steel to be tilted; since they can move their bodies to and fro (to bring every part of each bar under the operation of the hammer) more easily when they thus sit, paddling along with their feet, than if they stood or walked. The bars of steel are heated to a certain temperature in an adjoining furnace, and are then brought under the action of the tilt-hammer, where a deafening clatter is kept up for some minutes, accompanied by a vibration all around, which would shake to pieces any but a building of great strength.

It is one of the peculiarities of Sheffield that tilting is a trade by itself. In a map of the town we may see marked Mr. So-and-so's "*Tilt*;" for with the usual brevity of technical language, the whole building, with its hammers and furnaces, is called a tilt. These tilts are mostly situated on the banks of some one or other of the rivers which flow through Sheffield; and it is impossible to mistake them when once in their neighbourhood. There is one, for instance, close to the Lady Bridge, where from morning till night there is an incessant thumping, which shakes the very roadway itself. These tilters, or proprietors of tilt-works, receive steel in the form of bars, from any parties, and pass it under the tilt-hammers; after which their occupation is ended. At a few of the Works, such as those which form the subject of this paper, the tilting is combined with the other branches; but it may, nevertheless, be deemed a distinct branch.

We must now transfer our attention to that portion of the works which is appropriated to the *File-manufacture*.

These tools, simple and unimportant as they may seem, and probably do seem, to those who never enter an artisan's workshop, are among the most note-worthy articles made of steel. They are the working-tools by which every other kind of working-tool is in some degree fashioned. Whether a man is making a watch or a steam-engine, a knife or a plough, a pin or a coach, he would be brought to a stand if he had not files at his command. It may be a file with a hundred serrations to an inch, or with six or eight; it may have straight cuts like most files, or angular holes like a rasp; it may be two inches long, or a yard long; it may be round, or half-round, or triangular, or square, or flat; blunt or pointed, straight or curved;—but a file of some sort or other will be found in almost every workshop.

The first place to which we have to follow the file-makers is the *forge*. On the eastern side of the quadrangle of the Works is a range of sixteen arches or compartments, all opening one into the other. Each compartment is fitted up with all the appliances for forging files. There is on one side a forge-fire, with a hearth on which to place the fuel, and bellows placed behind, much in the same way as a common smith's forge, but with more attention to neatness and order. The workman's bench, if we may use such a term, is a large block of hard stone, weighing about three tons, and placed firmly on the earthen floor of the smithy or forge. On this are fixed one or more steel anvils, adapted by their size and shape to support the pieces of bar-steel while being forged into the form of files. There are also hammers of various sizes and peculiar shapes, and other small implements necessary to the

operation. The forges are arranged along an arched avenue so that all are airy and free from any great intensity of heat, except at the precise spots where heat is required. A file ought to be made of the very best steel, and is so, unless—like the razors mentioned by Peter Pindar, or the gross of green spectacles immortalized in the 'Vicar of Wakefield'—they are merely "made to sell." If a file be too soft, the whole toothed surface would be crushed down when applied to use; if too hard, the teeth would fly or break off at every stroke; so that very great care and skill are required in the manufacture; and a firm which has once acquired a reputation for good files is extremely solicitous not to damage it by the sale of even one that is defective.

The bars of steel are selected according to the size and shape of the files to be made, and when cut into pieces, each piece is placed among the burning fuel on one of the forges, and quickly brought to the required temperature. Except for the smallest files, there are two men employed at each forge—a *striker* and a *forger*, one of whom manages the fire, heats the steel, and acts as a general assistant; while the other is the superior



workman, who hammers the file into shape, and is responsible for its quality. There are various notches, ridges, curvatures, and gauges, on and about his small steel anvils, which enable him to work the piece of steel into the proper form for a file, including the narrow handle or 'tang.' The rate of working is such, that at the whole of the sixteen 'hearths' about fifty thousand dozens of files are made in a year. Each man accustoms himself to the making of one particular size of file, so that in passing along the range of forges, from one end to the other, we begin at the smallest files, and go on gradually to the largest. From the thickness and softness of the heated metal, there is very little rebound to the hammer, and this renders the work of the striker rather laborious, especially for large files, where a hammer of nearly twenty pounds weight is used.

The files are then annealed or 'lighted,' in order to bring the steel to a state of softness fitted for the cutting of the teeth. This is done by placing them on a kind of brick hearth in a furnace, and exposing them for several hours to a temperature determined by experience; then, without removing them, they and the oven are allowed to cool very slowly, by which the steel becomes annealed to a softness suitable to the subsequent operations.

Next succeeds the process of *grinding*, whereby the files (or 'blanks,' as they are yet termed) are ground down to a true and regular surface, whether that be flat or curved. In one part of the Works is a building where several grindstones of various sizes are ranged in a row, all turned by the steam-engine which works the tilt-hammers. Each grindstone is occupied by one man, who sits astride over a 'horse' or beam behind it, and leans over the grindstone, applying the file to the surface of the revolving stone in such a manner as to grind the former to a true and correct form. The process is wet and dirty, from the mixture of fragments of stone and steel with the water used in wetting the stone; and the attitude in which the grinder works renders the process rather a laborious one.

Then ensues the very important and curious operation of cutting the files, one which has hitherto defied the powers of machinery in an extraordinary manner. In one of the buildings of the works is a long room in which file-cutters are ranged round the sides in front of the windows, as in the next sketch, each one having a small bench before him with a simple apparatus for fastening down the file while being cut. The men range themselves according to the kind of file which they are cutting, each man confining himself pretty nearly to one size of tooth, and all placing themselves in the gradation of these sizes.

The file being slightly strapped down, the cutter takes a sharp tool or chisel in the left hand and a hammer in the right. This tool is a very hard, sharp, and tough piece of steel, having an edge fitted to produce the required kind of tooth, and a head to receive the blow of the hammer. The hammers employed (the heaviest of which weigh about nine pounds each) have the handle placed in a remarkable manner with respect to the head, being adapted at such an angle, that the cutter can, while making the blow, *pull* the hammer in some degree towards him, and thus give a peculiarity to the shape of the tooth. If the file is a flat one, or has one or more flat surfaces, the cutter places the small steel tool on it at a particular angle, and with one hammer-blow cuts an indentation. He then, by a minute and almost imperceptible movement, changes the place of the tool, and makes another cut parallel to, and a short distance from, the first; then a third, a fourth, and so on to the end of the file, shifting the file slightly in its fastening as he proceeds. Generally the file is cut doubly, one set of cuts crossing the other at an angle more or less acute. In this case he reverses the position in which he holds the cutting tool, and proceeds as before. If the file be round or half-round, or have a curved surface of any kind, he still uses a straight-edged cutting-tool: but as this can only make a short indentation, he has to go round the file by degrees, making several rows or ranges of cuts contiguous one to another.

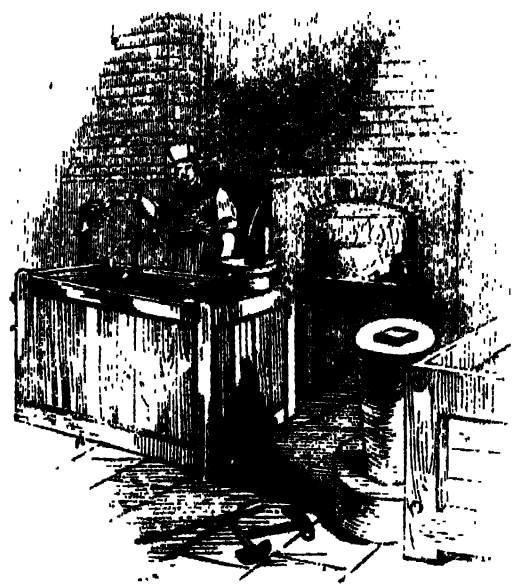
Such is the art of file-cutting; and it contains many points worthy of remark. In the first place, the angle at which the cuts are made depends greatly on the purpose to which the file is to be applied, and is made an especial object of the cutter's attention. In the next place, the cut is not a mere indentation, made without reference to form; it is a triangular groove of particular shape, the production of which requires a



most discriminating tact in the management both of the hammer and of the cutting-tool. Then again, the strict parallelism of the several cuts can only be brought about by practised accuracy of hand and eye, since there is no guide, gauge, or other contrivance for regulating the distance. In a round file, too, the several rows or cuts are brought side by side in such an exact manner, that it is difficult to conceive them to be formed singly and by hand. As an instance of what skill and long practice can effect in this respect, we have before us a file about ten inches long, flat on one side and round on the other; the flat side is cut with a hundred and twenty teeth to an inch, so that there are about twelve hundred teeth on that side: the round side has such an extent of curvature, that it required eighteen rows of cuts to compass it; each little cut on this side is not much above a twentieth of an inch in length; and the number is thus so great, that for the whole file there are twenty-two thousand cuts, each made with a separate blow of the hammer, and the cutting-tool being shifted after each blow!

It may well be asked—why is not this done by a machine? Machines in great number have been suggested, in France, in England, and in the United States: some by mere theorists, some by practical men; some have never extended beyond the drawn plans, while some have actually been set to work. Yet for some reason or other all these have failed to maintain their position: they have been tried, commented on, admired, and rejected. Not long ago a very ingenious machine, invented by a gentleman of high mechanical skill, was talked of highly in respect to its fitness for this purpose. But we believe that at the present time the whole of the files made at Sheffield (the headquarters of the trade) are cut by hand. The grounds of this want of success involve matters too technical for us to enter upon here; but we believe that one difficulty lies in this point—that if one part of the file happens to be in the slightest degree softer or narrower than the rest, any machine employed would make a deeper cut there than elsewhere; whereas a workman who has been employed in the trade from a boy (and none others, it is said, can acquire the requisite skill) can feel instantly when he arrives at any variation in the quality or condition of the steel, and at once adapts the weight of his blow to it.

When the files are cut, they are brought into the warehouse to be stamped with the corporate mark of the firm. They are next *hardened*, the steel having been before purposely rendered soft for the facility of cutting. This hardening involves details of some nicety, and the proper working of the file depends a good deal on the manner in which it is done. In one of the buildings is a long tank or trough, containing a saline liquid, and behind this are six hearths for heating the files. When each file has been heated to a certain temperature, it is plunged suddenly into the



liquid, and while yet warm is straightened by a small apparatus at hand. A mixture of alegrounds, salt, and other substances is also employed during this process.

The files are then scrubbed clean by women with sand and water; and lastly pass into the hands of the foreman, who tests every file singly in a way which brings both the hearing and the touch into exercise. He strikes the file gently on a piece of hard steel, and also rubs it gently from end to end; from the sound he judges whether the internal quality of the steel is good; and from the tremulous movement or friction he judges whether it is tempered to the degree of hardness required; nay, it is said that, even if deaf, an experienced man could tell this by the tremulous motion given to his fingers and wrist.



[Old Timber Houses at Coventry.]

ANCIENT COVENTRY.

Coventry as it is, though, from the appearance of its overhanging timber houses and narrow streets, it might seem to have undergone little change beyond that which time produces, is a very different place from Coventry as it was. It is still, indeed, entitled to be called a city, and has a county of its own, seven miles in length and twenty miles in circumference; but it is no longer "the third city in the realm," "the Chamber of Princes," the favoured city of kings and nobles, resorted to for the magnificence of its ecclesiastical establishments and the splendour of its annual shows. The lofty embattled wall which surrounded the city, with its towers and gates, has been levelled to the ground; its great priory and its cathedral, with their splendid architecture and sumptuous decorations, have been swept away; its monastery of Grey Friars, and its monastery of White Friars, are gone "with all their trumpery;" its lofty cross, of beautiful Gothic architecture, is no longer there. The visitors, on horseback and on foot, who crowded the city and put to proof the accommodation of its great inns, are no longer seen. Still there are remains of the architectural glories of Coventry exhibited in its ancient churches, its Guild-hall, and that old timber architecture which, as the city has never suffered the calamity of a great fire, still constitutes a larger part of the streets of Coventry than of almost any other of the ancient towns of England. Leland, writing in the reign of Henry VIII., says, "There be many fair streets, well builded of timber; there be divers fair suburbs without the walls." Old, dingy, and neglected, the houses are not now, indeed, so fair as then, when they were comparatively new and fresh, when the plaster was carefully whitened, and the timbers were painted, as well to make them durable as handsome. The picturesque forms of the timber frame-work still remain, but imagination is left to fill up the effect which would be produced, when, on occasions of pomp or festivity, a flag or pendent streamed from every gable pinnacle, and green boughs waved on every balcony.

On entering the city, the appearance of the streets at once indicates its high antiquity. The prosperity of the place appears in the beginning to have been chiefly owing to Leofric, fifth Earl of Mercia, who founded a monastery there, and bestowed many privileges on the town, of which he was the lord. Earl Leofric's wife was the celebrated Lady Godiva. The old legend of her riding naked through the city seems to rest on no good authority. Leofric died in 1057, and the strange and improbable story is not mentioned in any known writer earlier than Matthew of Westminster, who was living in 1307, 250 years afterwards. The lordship afterwards became vested in the Earls of Chester, the Earls of Leicester, and, in the reign of Edward III., in the Earls of Cornwall, when, being thus annexed to one of the royal titles, Coventry became an especial object of royal favour. Edward the Black Prince often resided there.

The wall was begun in 1355, by authority of a licence granted twenty-seven years before by Edward III. The thickness was nine feet; there were thirty-two towers suitable for defence erected at different points, and there were twelve gates. The circumference was three miles. It was nearly forty years before the wall was entirely completed. The wall was pulled down by order of Charles II., in consequence of Coventry having set at defiance Charles I. and his army when he appeared before the gates and demanded admission. In pulling down the wall, the first breach was made July 22, 1662, and by the aid of five hundred men, in rather more than three weeks, the wall, with the towers, was levelled, but most of the gates were left standing, and one or two of the smaller gates yet remain.

In 1397 Richard II. selected Coventry for the great trial by combat between the Duke of Hereford (after-

wards Henry IV.) and the Duke of Norfolk. Gosford Green was the spot chosen for setting out the lists, and a magnificent display there was, according to the picturesque description given by Holinshed. At the moment of the commencement of the combat, Richard put a stop to it, and banished both the combatants, Hereford for a term of years and Norfolk for life. (See Shakspere's 'Richard II.,' Act I.) Holinshed's description of the lists and the proceedings is given in Knight's 'Pictorial Shakspere,' at the end of Act I.

That lofty and beautiful piece of work, the steeple of St. Michael's church, was begun in 1373, and finished in 1395. The cost was chiefly borne by William and Adam Botoner, each of whom was several times Mayor of Coventry. The square tower is 136 feet high, and supports, on eight arches springing from the pinnacles, an octagon 32½ feet high, from the inside of which the spire, fluted and embossed, rises to the height of 139 feet 9 inches. The entire height is therefore 308 feet. It is altogether as striking in its general character as it is delicately symmetrical in its proportions and chaste in its ornaments. The body of the church is supposed to have been erected in the reign of Henry VI. The whole of the exterior has an air of grandeur. In the interior the centre is divided from the aisles by clustered columns supporting lofty arches. The ceiling is of oak, ribbed and carved.

Trinity church, though it suffers by comparison with its neighbour St. Michael's, is yet a handsome structure. The form is that of a cross. A square tower, 99 feet high, rises from the centre, and is surmounted by a spire 132 feet high. It was appropriated to the Prior of Coventry in the 44th year of Henry III.

St. John's church is also ancient, but still smaller than Trinity.

The Priory, which was founded by Earl Leofric, in the reign of Edward the Confessor, about 1043, was for twenty-four monks of the order of St. Benedict, with the privilege of choosing an abbot from among themselves, but after a short time the title of abbot was changed for that of prior. The priory was surrendered to the commissioners of Henry VIII. in 1538, and was soon afterwards ordered to be taken down. It stood on the south side of the river Sherburn. It appears to have been a large pile of buildings. In 1404 Henry IV. held a parliament in the great chamber of the Priory.

The Cathedral stood near the churches of St. Michael and Trinity, in a space called the Hill Close. It is said to have been a splendid edifice, built on the model of Lichfield Cathedral. The two churches and the cathedral, standing thus near each other, and seen without interruption from the area in which they were erected, must have formed a group as unusual as it was magnificent. The Cathedral was taken down at the same time as the Priory. Many earnest applications were made to Henry to spare the Cathedral, but in vain.

The Bishop's Palace, which stood at the north-east corner of St. Michael's churchyard, was sold in 1647.

The Grey Friars, or Friars Minors, are supposed to have settled in Coventry about 1234. They obtained liberal contributions, and erected a monastery and church on the south side of Coventry, on land allotted them out of the manor of Cheylesmore, Edward the Black Prince allowing them "to take so much stone out of his quarry in the park of Cheylesmore, as they should have occasion to use for their building and walls." There are no remains of the habitable part of the buildings; but a fine steeple with a spire springing from an octagon, which belonged to the church, are still in existence. The Grey Friars were the institutors of the far-famed Coventry pageants, and the performers of the Mysteries which annually attracted such a concourse of persons to Coventry on the day of Corpus Christi. (See 'Penny Magazine,' No. 671, vol. ii., New Series.) The order was suppressed in 1538.

The Carmelites, or White Friars, had also a monastery and church in Coventry. The order was suppressed in 1538, and the monastery and its possessions granted to Sir Ralph Sadler in 1545. Remains of the monastery now form part of the House of Industry. The church, which adjoined the city wall, without Newgate, is entirely gone.

The Cross, in Coventry, which was of such celebrity, occupied the place of a former cross of less pretension, which was erected in 1423, and taken down in 1510. The new structure was erected a few years afterwards. It was of Gothic architecture, and of exquisite workmanship. The form was six-square; each side was seven feet at the base; the entire height was fifty-seven feet. It was divided into three stories, and had seventeen niches with statues. The pillars and arches were adorned with figures and other carved-work. The whole was painted and gilded, and on occasions of display flags waved from every pinnacle, displaying the arms of England, of the founder, of the different guilds, &c. It was repaired in 1620, at an expense of 323*l.*, and again in 1660, at an expense of 276*l.* From this time, however, it seems to have been neglected, and gradually fell into decay and ruin. The last fragments were taken away in 1771.

Another of the glories of ancient Coventry was St. Mary's Hall, which fortunately yet remains. Coventry, in its "high and palmy state," was termed "The Chamber of Princes;" and St. Mary's Hall, not only for the beauty of its workmanship and the splendour and variety of its decorations, but for the number of royal and noble persons who have sat within its walls, and partaken of the liberality of the mayor and citizens of Coventry, may be supposed to have contributed in an especial manner to procure for the city that honourable title. The great hall is a noble room, twenty-one yards long and ten yards wide. The windows on every side are filled with painted figures and arms of kings, queens, and nobles, bishops, mayors of Coventry, and others. The hall also contains a piece of tapestry thirty feet long by ten feet high, extremely interesting, displaying Henry VI. and his courtiers, Queen Margaret and her ladies, and a variety of figures of saints, Christian knights, allegorical figures of justice, &c., the whole arranged in two series of three compartments each.

St. Mary's Hall was originally built in the early part of the reign of Henry VI. for the accommodation of the guilds of the city of Coventry. As these guilds were sanctioned and protected by the mayor and aldermen, the hall was not only used by the different companies for purposes of business or festivity, but was applied to the same purposes by the corporation, and on the suppression of the guilds it became the public hall of the city.

Another of the characteristics of ancient Coventry deserves to be mentioned, as displaying the vast number of persons who resorted to it in its prosperous days —"its great and sumptuous inns," as they are described by Harrison, "able to lodge two hundred or three hundred persons and their horses at ease, and thereto, with a very short warning, make such provision for their diet as to him that is unacquainted withal may seem to be incredible. And it is a world to see how each owner of them contendeth with other for goodness of entertainment of their guests, as about fineness and change of linen, furniture of bedding, beauty of rooms, service at the table, costliness of plate, strength of drink, variety of wines, or well using of horses."

In those days the visits of kings and queens were frequent—Edward III. and his son the Black Prince, Henry IV., Henry VI. and Queen Margaret, Richard III., Henry VII., Henry VIII., Elizabeth—as well as those of nobles and other dignified and rich persons.

USES OF THE HAZEL.

The hazel may be ranked among those trees which render more service as articles of food than as sources of timber; but it is nevertheless useful in various other ways; and an abstract of those uses, from the descriptions by Mr. Loudon and other writers, may not be uninteresting.

Generally speaking, the hazel is a shrub or low tree, but one variety is a timber-tree of middle size. The kind which produces the common hazel-nut grows to the height of about twenty feet. The bark is ash-coloured, and sometimes cloven on the trunk; but on the branches it is of a clear bright brown, frequently spotted with white. The leaves are roundish, stalked, and alternate, darkish green on the upper surface and lighter beneath. The rate of growth, under favourable circumstances, is from one and a half to two feet in the first two or three years after planting: after which, if trained to a single stem, the tree grows more slowly, attaining the height of twelve feet in ten years, and never growing much higher unless drawn up by other trees. It grows well under the shade of other trees, but not under their drip.

This tree is a native of all the temperate climates of Europe and Asia, and is found in every part of Great Britain, sometimes at so great an altitude as sixteen hundred feet. On the Alps the nut-trees are found at an altitude of nearly four thousand feet. Evelyn states that the hazel "affects cold, barren, dry, and sandy grounds; mountainous and even rocky soils produce them; they prosper where quarries of freestone lie underneath, as at Hazelbury in Wiltshire, Hazelingfield in Cambridgeshire, Hazelmere in Surrey, and other places; but more plentifully if the ground be somewhat moist, dankish, and mossy, as in the fresher bottoms and sides of hills, holts, and in hedge-rows." In Kent the hazel thrives best in a calcareous loam on chalk or rock; but in Scotland it is found on granite, basalt, and freestone.

There are many passages in the early writers indicating that the hazel was familiarly known. We read in the thirtieth chapter of Genesis, that "Jacob took him rods of green poplar, and of hazel and chesnut-tree, and pilled white strakes in them, and made the white appear which was in the rods." The hazel-nut was known both to the Greeks and Romans, the latter especially making frequent mention of it. The hazel was said by Virgil to be considered by the Romans as injurious to vines, on account of its spreading roots: and as the goat was equally injurious by browsing on the young shoots, the keepers of the Roman vineyards sought to remove both these evils by sacrificing the goat to Bacchus and roasting its entrails on hazel spits. The common hazel-nut and the filbert-nut are produced from two varieties of the tree; the former was by the Romans called *nux Avellana*, from the town of Avellino in Naples, where they have always been produced in great abundance; while the filbert was called the *nux Pontica*, from being found at Pontus. In later times the troubadours and old French romance-writers celebrated the hazel-bush and the hazel-nut in many of their songs.

But the most remarkable feature in the past history of the hazel is that connected with the superstitious "uses" of the tree and its fruit. This superstition has been very widely spread. There is a passage in Evelyn which shows the popular belief in his time. After enumerating some of the uses of the hazel in the arts, he adds:—"Lastly, for riding-switches and *divinatory rods*, for the detecting and finding out of minerals (at least if that tradition be no imposture), it is very wonderful, by whatever occult virtue the forked stick (so cut and skilfully held) becomes impregnated with those invisible steams and exhalations, as, by its spontaneous bending from a horizontal posture, to discover not only mines, subterraneous treasure, and springs of water, but criminals guilty of murder, &c. made out so solemnly, and the effects thereof, by the attestation of magistrates and divers other learned and credible persons (who have critically examined matters of fact), is certainly next to a miracle, and requires a strong faith. Let the curious, therefore, consult the philosophical treatise of Dr. Vallemont (*Physique occulte, ou Traité de la Baguet divinatoire*), which will at least entertain them with a world of surprising things." It is partly evident from the curious language adopted by Evelyn that he was half inclined to doubt the truth of these "surprising things;" but the general tone of feeling at the time was decidedly in favour of this kind of belief. The belief that certain gifted persons possessed the power of discovering hidden water or metals by means of a divining-rod is as old as the time of the Romans; but this potent wand was not always made of hazel, or even of wood; it was sometimes made of brass or other metal. A technical name, *rhabdomancy*, was coined in the fifteenth century to express this art, the word implying "divination by a staff or rod." Persons made a trade by this imposture, and called themselves rhabdologists or rhabdomists. The prophet or diviner took a hazel-rod, which was either curved or forked, and held it by the two ends so that its curvature should be inclined outwards. If the person who held the rod possessed the power of rhabdomancy, and approached any metallic vein or other magnetic substance, or came near them, a slow rotatory motion of the rod ensued in different directions, according to particular circumstances. In other cases the rod was peeled, and then laid on the palm of the hand, with the butt end of the twig on the pulse of the wrist; and the divinor moved slowly along till the rod pointed to the desired place; the rhabdomist feeling, at the same time, either a violent acceleration or retardation of the pulse, and a sudden sensation of great heat or great cold.

Sir Walter Scott makes use of this superstition in reference to Dousterswivel's pretended search for gold. Several instances of the use of the hazel divining-rod are recorded in the earlier volumes of the 'Gentleman's Magazine,' relating to the former half of the last century. In the seventeenth century the following description of the mode of proceeding was given: "The finding of gold which is under the earth, as of all other mines of metal, is almost miraculous. They cut up a ground-hazel of a twelvemonth's growth, which divides above into a fork, holding the one branch in the right hand and the other in the left, not held too slightly or too strictly. When passing over a mine, or any other place where gold or silver is hidden, it will discover the same by bowing down violently, a common experiment in Germany, not proceeding from any incantation, but a natural sympathy, as iron is attracted by the loadstone."

There were a few other modes in which the hazel acted a part in superstitious observances. The ashes of the shells of the hazel-nut, applied to the back of a child's head, were supposed to turn the child's eyes from grey to black. Our old herbalist says:—"Some doe hold that these nuts, and not wallnuts, with figs and rue, was Mithridates' medicine, effectuall against poysons. The oyle of the nuts is effectuall for the same purposes. If a snake be stroke with a hazel wand, it doth sooner stunne it than with any other strike; because it is so pliant that it will winde closer about it; so that, being deprived of their motion, they must need die with paine and want; and it is no hard matter, in like manner, to kill a mad dog that shall be strook with an hazel sticke, such as men use to walk or ride withall."

But we will proceed to uses more practical and un-

equivocal. The hazel-tree, in its wild state, affords protection to various small birds by its numerous branches. Considered as a timber-tree, the wood is never of sufficient size for building purposes; but it is used in cabinet-making, and for various smaller and more delicate productions. It is tender, pliant, of a whitish red colour, and of a close, even, and full grain; but it does not take a very bright polish. The roots, when of sufficient size, afford curiously veined pieces, which are used in veneering cabinets. The great use of the hazel, however, is for undergrowth. Being extremely tough and flexible, the root-shoots are used for making crates, hurdles, props, wattles, walking-sticks, fishing-rods, whip-handles, ties for faggots, springs to catch birds, for fastening down thatch, and for withes and bands for various purposes. A strong fence is made by driving stakes into the ground and wattling the space between them with hazel-rods. Evelyn, while speaking of the hazel, says:—"The use of the hazel is for poles, spars, hoops, forks, angling-rods, faggots, cudgels, coals, and springs to catch birds; and it makes one of the best coals, once used for gunpowder, being very fine and light, till they found alder to be more fit. There is no wood which purifies wine sooner than the chips of hazel. Also for withs and bands; upon which, I remember, Pliny thinks it a pretty speculation that a wood should be stronger to bind withall, being bruised and divided, than when whole and entire." After detailing other uses, he goes on to say:—"But even after all, the most signal honours it was ever employed in, and which might deservedly exalt this humble and common plant above all the trees of the wood, is that of *hurdles* (especially the flexible white, the red and brittle), not for that it is generally used for the folding of our innocent sheep, an emblem of the church, but for making the walls of one of the first Christian oratories in the world, and particularly in this island, that venerable and sacred fabric at Glastonbury, founded by St. Joseph of Arimathea; which is storied to have been first composed but of a few small hazel-rods interwoven about certain stakes driven into the ground: and walls of this kind, instead of laths and punchions, superinduced with a coarse mortar made of loam and straw, doe to this day enclose divers humble cottages, sheds, and outhouses in the country; and it is strong and lasting for such purposes, whole or cleft, and I have seen ample enclosures of courts and gardens so secured."

Hazel-rods, cut as nearly as possible of equal size, and varnished, form an admirable material for constructing rustic garden-seats and flower-baskets. Mr. Loudon gives two wood-cuts to show what may be effected in this respect. An agreeable variety may be produced by using the rods alternately peeled and unpeeled: or by mixing them with rods of some other kind of wood. Unpeeled hazel-rods are, however, both handsomer and more durable than similar rods of any other kind of tree; and a variety may be produced in them by choosing them with bark of different shades, or even staining them with a decoction of logwood or some other dye. Hazel-rods thus selected may be arranged in any fancy pattern for an arbour or other purpose; and a Mr. Matthews, a carpenter residing at Trimley in Berkshire, has carried this curious kind of art so far as to produce a landscape, by the interlacing and ingenious arrangement of differently coloured hazel-rods.

The nuts, or fruit, are deemed the most important part of the hazel-tree. Mr. M'Culloch states:—"Besides those raised at home, we import nuts from different parts of France, Portugal, and Spain, but principally from the last. The Spanish nuts held in the highest estimation, though called Barcelona nuts, are not really shipped at that city but at Tarragona, a little more to the south. Mr. Inglis says that the annual average export of nuts from Tarragona is from twenty-five to thirty thousand bags, of four bags to the ton. The cost was, free on board, in autumn, 1830, 17*s.* 6*d.* a bag. The entries of nuts for home consumption amount to from 100,000 to 125,000 bushels a year; the duty of 2*s.* a bushel producing from 10,000*l.* to 12,500*l.* clear." Evelyn says that in his time hazel-nuts, though considered unwholesome to those who were asthmatic, were "thought to be fattening; and, when full ripe, the filberts especially, if peeled in warm water, as they blanch almonds, make a pudding very little if at all inferior to what our ladies make of almonds." The kernels have a mild farinaceous, oily taste, agreeable to most palates. A kind of chocolate has been prepared from them; and they have been sometimes made into bread. The expressed oil of hazel-nuts, called nut-oil, is little inferior to that of almonds; it is best made in the middle of winter, as the nut yields little oil if made sooner; and if made later, the oil is apt to become rancid; but there is not much of it made in this country.

Hungarian Yeast.—The yeast prepared by the Hungarians will keep for a whole twelvemonth. During the summer season they boil a certain quantity of wheaten bran and hops in water. The decoction is not long in fermenting: and when this has taken place they throw in a sufficient portion of bran to form the whole into a thick paste, which they work into balls: they are afterwards dried by a slow heat. When wanted for use they are broken, and boiling water is poured upon them: having stood a proper time, it is decanted, and in a fit state for leavening bread. The Romans prepared their yeast much in the same way—taking wine in a state of fermentation, and working up a given quantum of the flour of millet with it; the paste thus obtained was made into balls and dried. It often happens that the yeast, the leavened dough, or the dough itself, will become acid in summer, and acidulate the bread: this may be remedied by throwing some fingersful of carbonate of magnesia in the yeast or paste.

Commercial Navy of Eastern Africa.—In approaching the land (at Patta), we were forcibly struck by the contrast in the coasting-trade carried on here, and the cheerless absence of it which we had observed in parts that we had lately visited, where man seeks to thrive solely by the sale of his fellow-creatures, and impiously (I conceive the word not ill applied) neglects the cultivation of the soil which nature has so liberally endowed. In all directions the large boats, or, as they are called, dows, were seen, principally freighted with the produce of the land, coasting their way along shore. Their extraordinary build did not fail to attract our attention. They are generally sixty feet long and fourteen broad, their head terminating in a long point, and their stern in one not much shorter; and as they are built like a wedge, so, on grounding and being left by the tide, or hauled up on purpose, they require to be shored in that position by logs, which they always carry. Their planking is more frequently secured to the ribs by Cairo lashings than by nails or bolts; and with some the seats or beams projected a short distance through the side, like those of Delagoa boats. Their huge square sail, of canvas or matting, has a yard above and below, with braces, and three or four bow-lines; and, notwithstanding their uncouth appearance, they are very swift, and sail much closer to the wind than most vessels. They are always well manned, and generally pull with sixteen oars or paddles, unless when in shoal water; they then prefer the employment of long slender poles used against the ground for propelling their canoes. In the management of these poles they show great dexterity, and it requires much practice to equal them. The dows, when large, have sometimes a small canopied space near the stern, on which, when prosecuting their voyage, the turbaned old chief is often seen standing and issuing his commands. Not a single instance have I known of one without an ornamental circle painted or carved on either bow or stern. These vessels are employed in the coasting-trade, in which grain is the principal article; and likewise communicating between the islands of Zanzibar and Pemba and the main.—*Captain T. Boteler's Voyage of Discovery to Africa and Arabia.*



[Court-yard of Tattersall's.]

AUCTIONS IN LONDON.—No. III.

[Concluded from p. 107.]

The general features of an auction-room are of course pretty much the same in London as in every other part of the country, but there is one very striking exception —Tattersall's; and which accordingly we proceed to describe somewhat in detail. The name of Tattersall is familiar and respected throughout Europe; and the circumstance implies, what the known history of the establishment confirms, that, apart from the magnitude and general probity of its transactions, there have been exhibited some peculiar characteristics on the part of its founders and managers which have honourably distinguished them from the mere horse-dealing fraternity. Now whether we look in the brief records that tell of the history of the founder, or wander through the place itself—now emphatically known as Tattersall's, we are not left long in doubt as to the nature of those characteristics. Richard Tattersall was training-groom to the second and last Duke of Kingston, brother of Lady Mary Wortley Montague, and husband of the notorious duchess, in whose service he remained till his noble employer's death in 1773. He then appears to have opened his auction-mart; but the foundation of his fortune was laid by the sale to him of the racehorse Highflyer, for the enormous sum of 2500*l.*; and, it is supposed, on credit, an evidence of the high character for integrity he must have already acquired. Of his personal qualities, perhaps the establishment is the best testimony; what Tattersall's is now, it seems to have essentially been from the very outset, a place where men of honour might congregate without breathing, or at all events in but a greatly lessened degree, the pestilential vapour that usually but too often surrounds the stable; where men of taste might enjoy the glimpses afforded of the most beautiful specimens of an exquisitely beautiful race, without being perpetually disgusted with the worst of all things —that of the jockey or horse dealer.

Familiar as the name of Tattersall's, however, is, there are no doubt thousands, even in London, who know not its locality. Let us state, then, that its entrance will be found at the south-eastern corner of St. George's Hospital (opposite Hyde Park gates); and as we pass through it downward, for the way slopes, we see before us the "Turf," a tap-room for the throngs of grooms, jockeys, and poorer horse-dealers and horse-fanciers. On our left we find the new Subscription Room, fitted up in the interior with desks, and ornamented with a portrait of Eclipse. Here the wealthier and more aristocratic classes, who in a great measure, dispense law and fashion, and opinion in all that concerns horse-breeding, racing, and betting, congregate in exclusive privacy, and on particular occasions a stirring scene is presented both within and without the walls of this building. "Let us suppose that the two thousand guineas stakes have been run for, and the winner is up as a favourite for 'the Derby.' It is a day for re-modelling or for making 'a book.' There is flutter and bustle and excitement ever in the penetralia of the Subscription-room, but the hubbub in the court defies description. All are eager, excited in earnest, even savage. Short and sharp are their exclamations, and in a language which the disciples of Irving might have been excused, had they mistaken it for one of the unknown tongues. 'Hedging,' 'levanting,' 'a hundred ponies to one,' and a triple bob-major rung on all the devil-may-care names of the whole list of horses entered for the Derby. This is the augury of coming events, but what passes when 'the struggle is over, the victory won?' Why, in the words of an older and better song, 'there's nobody knows,' at least nobody but the initiated. On the awful 'settling day' the doors are shut on the *profanum vulgus*, and the betters pay, receive, or make themselves scarce among themselves. It is quite useless for any one who has not the entrée to attempt to catch a notion of what passes; but scandal-mongers do say that a peculiar set of philosophers, great observers of life, may be noticed on such days hovering

in the neighbourhood—the sheriff's officers for the county of Middlesex."*

Let us now pass into the court-yard, the great business place of Tattersall's, the Auction Mart so renowned through all the breadth and length of horse-loving, horse-breeding, horse-racing Europe; and which from all parts sends hither its representatives, when the more important sales are going on, and, with a confidence justified by the known character of the house, commissions the proprietor himself to procure for the nobles and gentry of the Continent fresh supplies for their studs of the finest English horses. Our view shows the general aspect of the court-yard. That domed structure in the centre gives elegance to an humble but important appendage—a pump. The fox, we presume, belongs to the poetry of Tattersall's, suggesting, as it does, breezy rides over hill and dale and far-stretching moorlands. The bust above, of George IV., refers to more specific facts of which the establishment can boast; it is a type of the lofty patronage that has been acceded to the house from its earliest days. The bust represents the first gentleman of Europe, as he has been called absurdly enough, in his eighteenth year, when the prince was a constant attendant at Tattersall's. Since then no important name in sporting annals but could be found among the list of visitors. Around three sides of the court-yard extends a covered-way; at the extremity of one side stands the auctioneer's rostrum, overlooking the whole area. The stable, where the horses to be sold are kept in the interim, is close at hand, and excites attention by its size and admirable arrangements for light and ventilation. The ranges of ordinary stabling are also admirable specimens of what has been done in modern times to secure the health and comfort of their stately inhabitants. The public days are the Mondays in each week through the year, with the addition of Thursdays in the height of the season. The horses of the chief sale, that of the Monday, arrive on the Friday previous. When the settling time arrives, great are the bustle and excitement that prevail throughout Tattersall's. Vehicles of all kinds dash to and fro in incessant motion, or linger altogether inactive in rows about the neighbourhood, while their masters are bidding for a good hunter or a pair of carriage-horses. A more motley assemblage than the buyers or lookers-on at such times it would be impossible to find. Noblemen and ambitious costermongers, bishops and blacklegs, horse breeders, grooms, jockeys, mingling promiscuously with the man of retired and studious habits fond of riding and breeding the wherewithal to ride, tradesmen about to set up their little pleasure-chaise or business-cart, and commercial travellers, whose calling has inoculated them with a passion for dabbling in horse-flesh, and who, in their inns on the road, talk with great gusto and decision of all that pertains to Tattersall's, on the strength of some occasional half-hour's experience in the court-yard.

Whatever the advantages attending the maintenance of races, which are said to be the very corner-stone of the system of English improvements in horse-rearing, and therefore of all such establishments as the one in question, there can be no doubt that there are such serious accompanying evils, as may well make it a question whether entire abolition of the pastime, national though it be, will not be the preferable course, if those evils cannot be got rid of. The worst is the betting-book-making system, which the writer from whom we have transcribed a preceding passage thinks originated only in the last century. Holcroft relates the anecdote which led to this conclusion; who says, referring to the year 1761 or 1762:—"In addition to matches, plates, and other modes of adventure, that of a sweepstakes had come into vogue; and the opportunity it gave to deep calculators to secure themselves from loss by *hedging* their bets, greatly multiplied the bettors, and gave uncommon animation to the sweepstakes made. In one of these, Captain Vernon (Holcroft's master) had entered a colt or filly; and as the prize to be obtained was great, the whole stable was on the alert. It was prophesied that the race would be a severe one; for though the horses had none of them run before, they were all of the highest breed, that is, their sires and dams were in the first lists of fame. As was foreseen, the contest was indeed a severe one; for it could not be decided—it was a dead heat; but our colt was by no means among the first. Yet so adroit was Captain Vernon in hedging his bets, that if one of the two colts that made it a dead heat had beaten, our master would on that occasion have won ten thousand pounds; as it was he lost nothing, nor would in any case have lost anything." Such was the commencement of the system that has been since attended in the humbler walks of life with the most pernicious consequences. How irresistible is the temptation to embark in a scheme which promises, under certain circumstances—and these every one hopes to command—may be seen in the pot-house clubs that overspread the country, and which infest the metropolis to a degree that is positively fearful. Even youth itself is not secure from the immorality of the system; "a house in West Smithfield announces 'a Juvenile Derby Sweep, at 10*s.* 6*d.* each.'" But is all this necessary to horse-racing? If that cannot be answered in the negative, the next query will be, and it may come in a legal shape—is horse-racing itself necessary to the development of all that is valuable in that beautiful animal? The writer in 'London' thinks the gambling is unnecessary, and points out the means of repression. The Subscription-room at Tattersall's is frequented by the élite of the amateurs of the turf: it sets the fashion. If its members were to pass a resolution and enforce it, that no systematic gambling was to be allowed among them—that the 'book-makers' were to be told to betake themselves to Crockford's and Jonathan's, the proper resort of gentlemen of their profession—the example would in no long time spread, through the medium of the motley squad which thongs the Auction Mart, to catch a glimpse of the subscribers, and learn to imitate their deportment. Racing would become the pursuit of admirers of the horse exclusively—for the gambler cares not for the horse more than for his dice, or scrip and omnium. There is enough of pleasurable employment—of excitement in the breeding, acquisition and training of fine horses, and the uncertain contests of the course, without the spice of gambling. The patrons of the turf can keep it, what it has always been, a source of pleasure to themselves, a means of improving the national breeds of horses for all purposes, an annual festival to the whole people of England, and prevent it from continuing what it has been allowed in a great measure to become, a source of demoralization to thousands. If they, by their example, will but diffuse a healthy distaste for gambling through the bulk of sportsmen, the police will deal with the flash Derby-houses; but so long as they allow undetected blacklegs, trading book-makers, buyers and sellers of chances, to associate with and be in common estimation confounded with themselves, there is no possibility of checking the mischief." We hope all this may yet prove practicable; but in the mean time cannot but ask—Is it certain that the great body of the patrons of the turf possess or desire for themselves such "healthy distastes?" a very indispensable preliminary to their conveying them to others.

* 'London,' No. CXLVIII.—'Tattersall's.' an amusing paper, to which we must express our obligations.

THE PRESERVATION OF TIMBER.

Many animals are occasionally afflicted with diseases of an extraordinary kind, arising from the growth of vegetable substances within them; the vital organs being by degrees so eaten away or impaired as to terminate the existence of the animal. A vegetable fungus has been found attacking a species of West Indian wasp, and another has been detected in the silkworm; the animal in each case being almost eaten away by the growth of the vegetable within it. The peculiar effects designated *mildew*, *smut*, &c. are in like manner the results of fungous growth; and such is likewise the case in respect to *dry-rot*, that premature decay of timber which for so many years has attracted the attention of practical men.

The dry-rot in timber appears like a disease which, by decomposing the fibres, deprives the wood of all strength, and in a space of time more or less extensive reduces it to a mass of dry dust. This disease does not seem to have attracted much notice until the middle of the last century; and even long after then the matter was not regarded as of serious importance. At length, however, the premature decay of many of the royal ships attracted general notice, and inquiries were instituted in various quarters as to the cause of it. In 1810 the Queen Charlotte, a first-rate ship of war, was found to have the ends and joints of the beams covered with a mouldy, fibrous, and reticulated crust, constituting dry-rot. Theories and proposals emanated from all quarters, every one suggesting a mode of cure or of prevention, but all failing, because the nature of the disease was not at that time properly understood. At first it was not known whether *common rot* and *dry-rot* were the same; but in more recent times the points of difference between them have been clearly shown.

If a post of wood be driven into the ground, seasoned or unseasoned, it will speedily begin to decay just at the surface of the ground, or, as it were, between the earth and the air. If driven into the earth through water, as in a pond, the decay will commence at the surface of the water, or, as it is technically expressed, "between wind and water;" whilst all that is above water and all that is constantly in the water, as well as the part in the earth, will remain sound. In these cases the rot begins *externally* and progresses inwards. But if the same post be well charred, or covered over with a thick coating of paint or varnish, no such effect will be produced externally, the coating being sufficient to protect it against the action of the weather. If, however, the post happen to be a green and unseasoned piece of wood, in no great length of time it will, even though tarred or painted, be found in a decaying state *internally*, whilst the outer surface appears uninjured, although in course of time this too becomes affected. The wood swells, changes its colour, and emits gases which have a mouldy or musty smell. In the more advanced stages of the decay cracks appear in transverse directions; and, lastly, it becomes pulverulent and forms vegetable earth.

Thus the *common rot* is an external disease extending inwards; while the *dry-rot* is an internal disease extending outwards: and it is plain that the causes of decay must be sought for in different directions. As to dry-rot, it became generally understood to result from the growth of a species of fungus or mushroom within the pores of the wood; but it was not till within a comparatively recent period that it became satisfactorily proved how the growth occurred. Some said that the dry-rot *is* a fungus; others that it is the *effect* of a fungus; and the latter seems now to be deemed the correct opinion. The first indication of dry-rot consists in small white points, from which a filamentous substance radiates parallel with the surface of the timber; and this is now considered to be the first stage of growth of the fungus-seed, the filamentous matter being the spawn. As this spawn gathers strength, its filaments insinuate into the crevices of the wood; and these filaments being exceedingly fine, they readily pass down and between the tubes from which the wood is organized, forcing them asunder, and completely destroying the cohesion of the tissue. When the filaments of many fungi interlace, the radiating appearance can no longer be remarked; but a thick, tough, leathery, white stratum is formed wherever there is room for its development, and from this a fresh supply of the destructive filament is emitted, which will gradually rot the whole mass of timber.

The vegetable fungus may fairly be supposed to obtain a lodgment in the timber by the settlement or subsidence of the seeds of the fungus. The fine impalpable powder that issues from the common "puff-ball" will give some idea of the myriads of minute seeds which it encloses; and if we suppose a similar countless host of seeds to result from the fungus tribe, it is not difficult to conceive how these may, by being wafted through the air, fall on the soil near where a tree is growing, and become absorbed with the sap. The seeds, it is supposed, are carried up the longitudinal tubes in a growing tree by the rising of the sap; but so long as the vital principle in the sap of the tree remains in activity, the vegetation of the parasite does not commence. Indeed it appears that the sap must be brought into a kind of putrefactive or fermenting state before the germination of the seed begins; and hence if the dry-rot is seen in a living tree, it is only in some decayed or diseased part.

The production of dry-rot in timber being thus considered to be the germination of fungus-seeds in wood-sap while in a fermenting or decomposing state, the prevention and cure seem to lie in the removal of the ferment: for it does not appear probable that we could prevent the seeds themselves from being carried up into the living tree. Under this view of the case, there have been three classes of expedients adopted for the prevention of dry-rot:—first, drying or seasoning: secondly, immersion in earth, sand, or water; thirdly, impregnation with a foreign substance which will resist putrefaction.

It has been conceived that if the sap or juice of wood be thoroughly dried, it will not form a medium in which seeds will germinate, and hence the very common and well-understood practice of 'seasoning.' Time will effect this seasoning, if the atmosphere be dry, and the wood be exposed to the free action of a current of air; but if the wood be exposed to alternations of heat and moisture, the sap does not dry, nor can the germination of the fungus be prevented. It used to be the custom to let ships of war remain two or three years on the stocks, while 'in the frame,' to season; but it is now known that that method was wrong, since the rain which lodged in the bottom of the hull, being only partially and slowly removed, encouraged the growth of the fungus. It is mainly on this account that our royal dockyards are now provided with excellent roofs over the building-slips, so that a ship on the stocks may be shielded from rain overhead, while at the same time there is free access of air on all sides. The stacks of timber in the dockyards, too, instead of being placed as formerly on the ground, are raised on iron or stone supports, so as to let air circulate beneath as well as around them.

Sometimes timber is seasoned by charring or scorching its surface, which dries up the sap; but this in some degree injures the timber, and gives it a property of imbibing additional moisture. Kiln-drying, too, which is sometimes adopted, is not so advantageous to

the timber itself as natural drying in the open air. An attempt was made some years ago to combine with the kiln-drying process another, by which the pores which had become dry were filled up with some resinous or oily substance; but it did not succeed, and every modification of kiln-drying seems to have failed. In former times there existed a very prevalent opinion, that if a tree were felled in the winter there would be no sap in the pores, and that dry-rot would not ensue. Hence many ordonnances and enactments were made in France and England, regulating the season when oak-trees might be felled, and directing that "the wind at the north" and the "wane of the moon" should be deemed favourable times for felling. But there is no decisive proof that this principle is worth much as respects the prevention of dry-rot.

Steeping in fresh water, in earth, and in sand, have all been recommended as means of preventing dry-rot. In the first of these modes the water appears to dissolve or liquefy the juices of the wood, and thus prepare them for drying in the open air. It is said that all the timber used in constructing ships at Brest is steeped for a long time in water before being used, and that the ships constructed of it are always free from dry-rot. It is found that if the 'butt' end of a log of timber be placed towards the current in a running stream, the juices become dissolved and washed out more readily than if the other end be presented towards the current,—a circumstance which seems to indicate something like a valvular structure in the pores of wood. Although the effect of immersion in running water was known or suspected long ago, yet it has only within a few years been applied in the British navy. A mast of a ship which had been at the bottom of a pond fifty years was found perfectly sound and good: a frigate, previously infected with dry-rot, sank in Malta harbour, and, after lying there several months, she was found on being raised to be totally freed from the dry-rot: some logs of timber at Pembroke Dock-yard, previously infected, were cleansed and rendered healthy by immersion in water: and lastly, an infected ship, purposely sunk in Plymouth Sound, was restored to a healthy state by immersion in the water for eighteen months. These facts drew the attention of the Admiralty to the subject; and sea-water is now deemed a valuable means of increasing the durability of timber for ships. It is supposed to act by destroying the vitality of the fungi which may be lodged in the pores; but whether it prevents the fermenting or putrefactive action of the sap seems not yet to be quite determined.

The last method we have to mention, viz. *impregnation*, is the one to which attention is most directed in the present day. This consists in extracting the sap from the wood, and supplying its place with substances which will not allow the fructification of the fungi. There have been a constant series of inventions having this object in view for more than half a century past. Mackonochie, in 1803, impregnated timber in the following manner:—He placed the wood in a steam-tight chamber, and subjected it to the action of steam, by which the air and gases were expelled both from the chamber and from the timber. Then, by condensing the steam, and repeating the process until the whole of the elastic fluids were withdrawn from the wood, and the non-elastic converted into vapour, the wood became freed from them. The wood was then plunged into oil, and the atmospheric pressure was allowed to act on it, whereby the oil was forced into the pores of the wood. Other substances instead of oil have been proposed for this purpose. One inventor proposed to saturate the wood with a solution of green vitriol, and then precipitate the vitriol by means of lime-water. Another succeeded in impregnating wood throughout with asphaltum. The kreosote resulting from the distillation of tar has been named as a fitting substance for effecting the impregnation.

The process of *Kyanizing* involves something more of a chemical principle. Dr. Birkbeck, in a lecture which he gave on the subject, spoke thus of the steps whereby Mr. Kyan arrived at his results:—"Aware of the established affinity of *corrosive sublimate* for albumen, he applied the former substance to solutions of animal matter, both acetous and saccharine, in which albumen was a component, with a view to preserve them in a quiescent and incorruptible state; and obtained a confirmation of his opinions by the fact, that during a period of three years the acetous solution openly exposed to atmospheric air had not become putrid, nor had the saccharine decoction yielded to the vinous or acetous stages of fermentation, but were in a high stage of preservation. He conceived, therefore, that corrosive sublimate, by combination with albumen, was a protection against the natural changes of vegetable matter; and thence inferred that, albumen forming a part of wood, the latter would be protected by converting that albumen into a compound of corrosive sublimate and albumen." This was the basis on which Mr. Kyan's arrangements were made.

Sir William Burnett, physician-general to the navy, took out a patent about five years ago for a method in which chloride of zinc is the active agent. His plan is, to provide a tank partly filled with a solution of the chloride, and to steep the wood (or canvas, cordage, or sailcloth) in the solution. Wood is steeped from ten to twenty-one days, according to the thickness of the pieces. Before being used for ship-building, or for building or repairing houses, it is recommended that the wood be coated at all the parts where joints are to be made, such as joist-ends, &c., with a paint made of oxide of zinc ground up with oil.

In Uzielli's patent, of more recent date, the timber is placed upright on one end, and a flexible waterproof bag is adapted to its upper extremity. Into this bag is poured a solution of common salt, which, percolating through the pores, is intended to drive the sap before it, both sap and solution dropping from the pores at the lower end. This is evidently only a modification of the salt-water process of earlier times. Other chemical substances are used instead of salt to give hardness, flexibility, elasticity, colour, fragrance, and other qualities to the wood; but the salt solution is the only one relating to preservation.

In Payne's process the object is to give to the wood a kind of stony or granulated texture, by impelling into the pores, by exhaustion and pressure, solutions which there form solid compounds.

Perhaps the nature of some of these processes may be best explained by giving an abstract of a paper read before the Institute of Civil Engineers last year, on the preparation of the sleepers for the Hull and Selby Railway. There were two cylindrical tanks of wrought-iron, seventy feet long by six in diameter, together with a reservoir, two force-pumps, and an air-pump. The timber was placed in the tanks, and the air exhausted by means of the air-pump. A solution of corrosive sublimate was prepared, having a certain definite weight of the sublimate to a given quantity of water; and this solution was admitted into the tanks. The force-pumps were then used, to force the solution into the pores of the wood, so that every pore became saturated with it. So long as air remains in the pores, it will resist the entrance of liquids, and hence the necessity for the use of an air-pump. With eighteen or twenty loads of timber in each tank, eight men were occupied five hours in the exhaustion and pressure. It was found that the solution had penetrated to the very heart of the wood. One pound of corrosive sublimate prepared about seventy cubic feet of timber.



[Sphinxes, or Hawk-moths. 1, 1, 1, Acherontia atropos; 2, 2, Smerinthus ocellatus; 3 3, Sphinx Ligustri; 4, 4, 4, Smerinthus Populi; 5, 5, 5, Sphecia apiformis; 6, 6, Macroglossa Stellatarum; 7, Trochilium cynipiformis.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

British Moths.

The beauty and the delicacy of their plumage, its fulness, and the marbled arrangement and blending of varied tints of grey, brown, black, and different tones of yellow, render the moths of our island not inferior in attractiveness to the more gaily painted butterflies that court the bright sunbeams of summer.

In general, the moths, as we well know, are nocturnal in their habits. Like the owl, which so much resembles many of them in style of plumage, they remain concealed in their retreats during the day, quietly reposing till the growing darkness calls them forth to visit the dewy flowers, and revel in the enjoyment of existence, till the dawning day drives them to their wonted lurking-places.

When, however, we say that the moths are nocturnal in their habits, we must add that this law has its exceptions; for we find one family to consist of species which are active only on the approach of evening and early in the morning,—a few being as diurnal as the butterfly, and flitting in broad day from flower to flower in quest of honeyed food. We allude to the family of Sphinxes, or Hawk-moths.

The Hawk-moths (Sphingidæ) are remarkable for their size, and the extent of their wings, which are extremely vigorous and well adapted for rapid flight. Their progression through the air resembles that of a hawk (hence the term Hawk-moth), or rather perhaps that of some of the humming-birds. Mr. Darwin says,

"The humming-birds seem particularly fond of shady and retired spots; wheſever I saw these little creatures buzzing round a flower with their wings vibrating so rapidly as to be scarcely visible, I was reminded of the Sphinx-moths; their movements are indeed in many respects very similar." Among other names the Creoles in Cayenne and the Antilles term the humming-birds Bourdons, in allusion to the humming of their wings; and the Sphinx-moths have received for the same reason the name of Papillons-Bourdons.

These moths have near the base of the external edge of the lower wings a stiff or scaly bristle in the form of a little spine, which passes into a sort of hook on the under surface of the first pair of wings, so as to maintain them during repose in a horizontal or inclined position; but this character occurs in other moths. The hinder wings are small. The antennæ are prismatic, and terminated by a minute feather or thread. The caterpillar is naked, cylindrical, always with sixteen feet, and mostly with a dorsal horn or taper appendage near the extremity of the body; the sides of the body are almost invariably marked with oblique stripes. The remarkable attitude which the caterpillars of the Hawk-moths often assume, resembling that of the fabulous sphinx of the ancients, suggested to Linnæus the scientific term (genus Sphinx, Linn.; family Sphingidæ, Auct.) by which they are still denominated. In order to undergo their transformation and assume the pupa state these caterpillars descend to the ground. The pupa is naked and conical, and often furnished with a detached horn extended beneath the breast, containing the spiral proboscis, which in some species is of extraordinary length. Some Hawk-moths, however, have it short, and in the pupa of those species this horn is wanting. We may here observe, that there is an interesting connection between the length of the tongue, or spiral proboscis, and the rapidity of flight, which merits attention. Such species as have this organ of great length, hover over tubular flowers, extracting the honey from the deep nectary, which they are thus enabled to reach; and here again we are reminded of the humming-bird with its long suctorial tongue.

The caterpillars of some species are capable of elongating and contracting the three anterior segments of the body in a very curious manner, as we observe in the proboscis of the elephant. These caterpillars undergo their transformation in a cocoon within a folded leaf on the ground; the majority, however, descend to a considerable distance into the earth, and form an oval cell, where they assume the pupa state, to issue forth a perfect insect.

With respect to great rapidity of flight and elongation of the proboscis, one remarkable species, the Death's-head Hawk-moth, forms an exception. Consequently it cannot be considered as typical of this family; yet such has a talented zoologist regarded it,—and why? Because it carries on its thorax the sign and seal of the symbol which nature designed it to be, in impressing upon it the figure of the human skull, the emblem of death and the grave; whilst the threatening attitudes of the caterpillar, and the depth at which it buries itself in order to become a chrysalis, as if seeking Hades, add claims to its becoming the ill-omened representative of the family!

1. The Death's-Head Hawk-moth, or Bee Tiger Hawk-moth (Acheronta atropos), Sphinx atropos, Linn.

This magnificent species appears to be distributed over our island, and Europe generally; its singularly marked thorax and the sound it emits have rendered it an object of terror with the superstitious, and to the evil influence of these dreaded Hawk-moths, which happened to make their appearance in great numbers in Brittany during the prevalence of an epidemic raging at the time with violence, the excessive mortality was popularly attributed. The squeaking noise which this insect utters it is difficult to account for; Réaumur attributes it to the friction of the proboscis against the palpi. M. de Johet, however, found that when deprived of these organs the moth was still capable of uttering the noise, especially when the wings were quivered, and he supposes it to arise from their action upon the air contained beneath the scales of the thorax. M. Lorey conceived the noise to result from the rushing of the air through two tracheæ at the base of the abdomen. Other opinions have been published, but none which give a satisfactory explanation. The insect, as ascertained by Mr. Raddon, is able to produce the sound before quitting the pupa-case. Another singularity connected with this insect is the circumstance of its attacking beehives, despoiling them of the honey, and scattering the rightful inhabitants in every direction.

It is indeed very strange that, without sting or shield, and with no advantage except that of size and courage, this moth should be capable, singly and unassisted, of contending successfully with a horde of sting-armed insects, and driving them from their fortress.

The Death's-Head Hawk-moth varies from four to five inches in the expanse of its wings. The upper pair are brown varied with black. The disc is marked with undulating lines of black and ferruginous patches, and powdered with white. Hind-wings fulvous orange, with a narrow central and a broader indented bar running parallel with the hinder margin. Head and thorax brownish black, the latter with a large pale skull-like mark on the back.

The caterpillar is at first dirty red, but afterwards becomes yellowish green, granulated with minute black tubercles on the back; there are seven oblique stripes on the sides, each stripe being blue anteriorly, white posteriorly, and purple in the centre. It mostly feeds by night, concealing itself in the day under leaves or clods on the earth; the flowers and leaves of the potato and jasmine, and also the leaves of the woody nightshade, thorn-apple, &c., constitute its food. The moth appears at the end of September or beginning of October.

2. The eyed Hawk-moth (Smerinthus ocellatus), Sphinx ocellatus, Linn.

This beautiful species is widely distributed through England, but is rare in Scotland; on the Continent it is abundant. It makes its appearance in May; it varies in the expanse of its wings from two inches and three-quarters to three inches and three-quarters. The fore-wings are of a pale rosy ash, variegated with pale chocolate brown and undulated marks of dusky. The hind-wings are of a rose pink, shaded off to grey on the margin, and marked near the inner angle with a large black spot, with a pale blue ocellus, the middle being of a slaty black. The caterpillar is of a very pale green, with minute black tubercles, and eight oblique pale bars along the sides. The lateral spiracles are marked by rosy brown. It feeds on the willow and sallow, and occasionally on the apple, sloe, &c. The chrysalis form is assumed in September, and the moth appears in May.

3. The Privet Hawk-moth (Sphinx Ligustri).

This elegant moth is by no means uncommon, varying in the expansion of the wings from three inches and a half to nearly five inches. The fore-wings are of an ashy colour tinged with roseate, and shaded and marbled with dusky brown. The hind-wings are of a pale rose-colour, darker at the base, with three black bands; the sides of the thorax are ashy white, the back black. The caterpillar feeds on the privet, lilac, elder, ash, &c. Its colour is green, with the caudal

horn black above and yellow beneath. On each side of the head is a black mark. The spiracles are orange, and there are seven oblique stripes on the sides, of purple and white. Towards the middle of September the caterpillar buries itself in the earth, and changes into a dark brown chrysalis. The moth appears in June or July.

4. The Poplar Hawk-moth (Smerinthus Populi), Sphinx Populi, Linn.

This species is very common, occurring in England and the south of Scotland. Its expansion of wings is often more than four inches. The upper wings are of a delicate lilac grey, with undulations of brown. The base of the hinder wings is broadly ferruginous. The body pale lilac grey. The males have the markings of the wings deeper than the females. The caterpillar is pale green, sprinkled with minute white tubercles: the spiracles and membranous feet are reddish; oblique lateral lines pale yellow. The food of the caterpillar consists of the leaves of the willow-poplar and aspen: the moth appears from the end of June to the middle of August, and sometimes as late as September.

5. The Hornet-moth (Sphecia apiformis).

This small but very beautiful moth is of a brownish black: the head and palpi are orange coloured; the thorax has a large orange patch on each side in front, and two ochre patches on the disc behind. The abdomen is ringed with orange and black. The wings are narrowly edged with ochre brown; but everywhere else transparent, like the wings of a wasp or hornet.

The caterpillar is thick and whitish: and feeds upon the wood of the trunks of willow and aspen trees, to which it often occasions great damage. The pupa is elongated and of a dark chesnut colour; this stage is assumed in April, and the perfect insect is produced at the end of June.

6. The Humming-bird Moth (Macroglossa stellatarum.)

Of this interesting species three broods appear every year, namely, in April, June, and September, and specimens have been taken as late as Christmas; indeed it is probable that some occasionally live through the winter. "This interesting species," says Mr. Curtis, "in the winged state frequents gardens, flying in the sunny weather between the hours of ten and twelve in the morning, and those of two and four in the afternoon. Its food is the nectareous juice of tube-bearing flowers. This it extracts with amazing address by the assistance of its exserted spiral tongue, immitably poising itself all the while on rapidly vibrating wings, whence its name of humming-bird. It is delightful indeed to an entomological eye to behold and contemplate the dexterity exhibited by this charming insect whilst it sails, all gaiety and grace, round the tall sprig of a larkspur, or other flower, probing to the very bottom every single tube, neglecting none, and trying no one twice." Fortunately the species is by no means of rare occurrence in nearly every part of the kingdom, so that opportunities of observing it are not uncommon.

The expansion of the wings of this moth is nearly two inches; they are of a dusky brown colour, with waved transverse bars of black. The hinder wings are orange coloured. The body is varied with yellow and black.

The caterpillar is dark green, with a dusky line down the back, and a white lateral longitudinal line. Legs yellow.

7. The Golden-tail Hawk-moth (Trochilium cynipiforme), Sphinx chrysorrhœa, Donov.

This is a small species, and by no means common. It has been taken in the woods of Kent and Surrey; and about London and Cheltenham; in Bedfordshire and Shropshire. It is of a blue-black colour; on the head is a white stripe, and the collar and palpi are yellow. The thorax has a yellow stripe on each side, and the breast a yellow spot; the abdomen has a yellow mark at the base, and three yellow bands, the last of which is double in the male. The wings, which are transparent, like those of a gall-fly, have the veins and margins brown, glossed with blue and fulvous, and a transverse, lunate, central spot of orange margined with black on the outside. Legs yellow.

The caterpillar is whitish, with a brown head, and is found under the bark of the oak and birch. The insect appears in June.

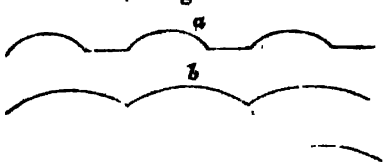
Education in Germany and America.—The two most strongly contrasted cases which can be found are probably those of Germany and the United States. In the United States, it is well known, a provision of university education is made as ample as that of schools for an earlier stage; yet no one pretends that a highly finished education is to be looked for in that country. The cause is obvious. In a young nation, the great common objects of life are entered upon earlier, and every preparatory process is gone through in a more superficial manner. Seats of learning are numerous and fully attended, both in Germany and America, and they testify in each to a pervading desire of knowledge. Here the agreement ends. The German student may, without being singular, remain within the walls of his college till time silvers his hairs; or he has even been known to pass eighteen years among his books, without crossing the threshold of his study. The young American, meanwhile, satisfied at the end of three years that he knows as much as his neighbours, settles in a home, engages in farming or commerce, and plunges into what alone he considers the business of life. Each of these pursues his appropriate objects: each is right in his own way: but the difference of pursuit indicates a wider difference of sentiment between the two countries than the abundance of the means of learning in each indicates a resemblance. The observer must therefore mark not only what and how many are the seats of learning, but who frequent them; whether there are many, past the season of youth, who make study the business of their lives; or whether all are of that class who regard study merely as a part of the preparation which they are ordained to make for the accomplishment of the commonest aims of life. He can scarcely take his evening's walk in the precincts of a university without observing a difference so wide as this. The great importance of the fact lies in this,—that increase of knowledge is necessary to the secure enlargement of freedom. Germany may not, it is true, require learning in her youth for political purposes, but because learning has become the taste, the characteristic honour of the nation; but this knowledge will infallibly work out, sooner or later, her political regeneration. America requires knowledge in her sons because her political existence itself depends upon their mental competency. The two countries will probably approximate gradually towards a sympathy which is at present out of the question. As America becomes more fully peopled, a literature will grow up within her, and study will assume its place among the chief objects of life. The great ideas which are the employment of the best minds of Germany must work their way out into action; and new and immediately practical kinds of knowledge will mingle themselves, more and more largely, with those to which she has been, in times past, devoted. The two countries may thus fall into a sympathetic correspondence on the mighty subjects of human government and human learning, and the grand idea of liberty may be made more manifest in the one, and disciplined and enriched in the other.—*Miss Martineau's 'How to Observe—Morals and Manners.'*

ANIMAL MOTION.—No. VII.

Running.—The object of calling into action the locomotive organs as we employ them in running, is to acquire a greater velocity than can be attained in walking. On investigation it is found that the same motions of the body recur after each double step, as in walking. In running, the time of action is divided into two periods, in one of which the body is supported on one leg, and in the other it is not supported on either, and this constitutes the principal difference between running and walking; for in the latter the body is always supported either by one or both legs.

Let us now consider the motions of the legs in running, as we have before done in walking; and for that purpose let us trace their action from the beginning to the end of a step. When the hinder leg, on which the trunk was supported, having been extended to its greatest length, is raised from the ground and begins to swing forward, we observe that the foremost leg has not yet reached the ground, so that both legs are found swinging at the same time during a portion of the step. When the foremost leg reaches the ground, which it does in a vertical position, the trunk is supported on it, and the hinder leg continues to oscillate forwards, whilst the supporting leg, having turned on the ball of the foot as on a pivot, becomes stretched to its extreme length, and is in its turn raised from the earth before the swinging leg has reached it; and when the latter is placed on the ground and is fully elongated, so as to be on the point of rising again, a double step has been accomplished, the single step evidently ending at the moment when the other leg reached the corresponding position. The effect of both legs swinging simultaneously, though for a very short period, is, that in running the duration of the step is less than the time of the half-oscillation of the leg, whilst in quickest walking it just exactly equals it, and in slow walking it is greater than this semi-oscillation. These effects will, perhaps, be made more intelligible by the annexed *Fig.* 1, where *a* represents slow walking, the straight

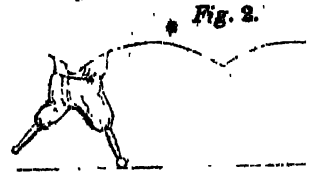
Fig. 1.



portions of the line being the times when both legs are on the ground; *b* represents quickest walking, wherein each leg succeeds the other in swinging without interruption; and *c* running, wherein one leg begins to swing before the other has finished swinging. The forces which are employed in running, like those of walking, consist of extension, gravity, and resistance.

We are not able to propel the centre of gravity horizontally in running, though the undulations are found by observation to be less than in walking; for it is clear that, as soon as both legs are lifted from the ground, it must fall during some portion of the time it is unsupported, and so form a series of curves. If the legs were inflexible, the centre of gravity would describe a series of curves as in *Fig.* 2. The movements

Fig. 2.



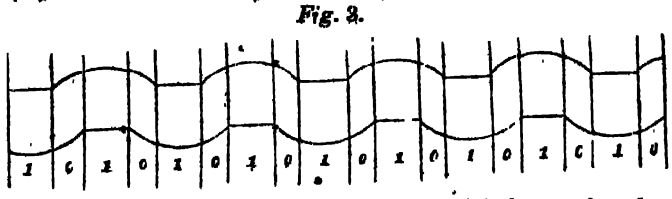
of the body in walking and running more nearly resemble each other according as the times wherein both legs are on the ground, in the former case, and both legs are in the air, in the latter, are diminished; and the limit to which each of these motions continually approaches is, when the body is never without support, but that support is never more than one leg. As the resistance of the air to the motion of the body is greater in running than in walking, the trunk is more inclined in the path of motion, to keep it in a state of equilibrium.

In order to find the amount of the vertical undulations of the body in running, the Messrs. Weber viewed the runner through a telescope adapted for the purpose. They estimated the undulations of the body to be from three-fourths of an inch to one inch and a quarter, and the time of a step to be from one-fifth to one-fourth of a second; of this time the body swings freely in the air one-tenth, and falls one-fifteenth of a second. If we calculate the space through which the body falls in the same time, by the law of falling bodies, it will be found that the centre of gravity descends about eight-tenths of an inch.

It has been seen in No. VI., *Fig.* 1, that in walking, the period during which the trunk is supported is longer than that in which the leg whilst swinging is supported by the trunk. Now, in running the reverse takes place, and the time in which the leg is resting on the ground is shorter than that in which it hangs suspended from the trunk.

We will now illustrate these periods by a diagram. In *Fig.* 3, let the upper line represent the motion of the left, and the under line that of the right leg, in the act of running, the curved portions being the periods of the leg swinging in the air, and the straight the

Fig. 3.



periods of its resting on the ground, which periods are defined by the cross lines. The figures 1, 0, denote that one or neither of the legs is on the ground. The line between the first spaces 1 and 0, at the left end of the figure, indicates the beginning of a step corresponding with the description already given, that is, the instant when the left leg is raised from the ground, and before the right has reached it.

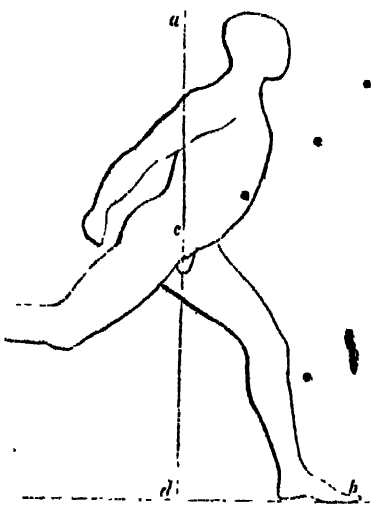
We observe that the chords of the curved lines, which represent the periods whilst the legs are swinging, are sensibly longer than the straight lines; and if we remember that the resting leg rises from the earth before the other touches it, we at once see that it could not be otherwise; and it also follows, from the same reason, that the straight lines showing the portion of the step when the leg is on the ground, must be equidistant from the extremities of the curves respectively opposite to them.

In running, the square of the length of the extended leg is equal to the sum of the squares of the horizontal

space described by the centre of gravity, during the time the one leg rests on the ground, and of the height of the centre of gravity from the plane of motion, at the end of that time.

When the forward swinging leg reaches the ground at the end of each step, it must be in a condition to receive the falling trunk, and be prepared to project it from the ground, to swing again in the air; for this purpose, the centre of gravity must be in the vertical line passing through the head of the thigh-bone and foot: for if the centre fell behind this line, the runner would fall backwards; and if before it, he would fall forwards. Such being the law which is found to regulate the attitude of the body and leg in running, it is a matter of considerable importance that artists should understand this principle, together with all the other laws by which the locomotion of man and animals is governed. It was in consequence of his being ignorant of, or not attending to, these laws, that some of Flaxman's figures were drawn so unlike the reality, which is the more to be regretted because his drawings of the human figure are considered as studies by young artists. We give an illustration of this in *Fig.* 4, which

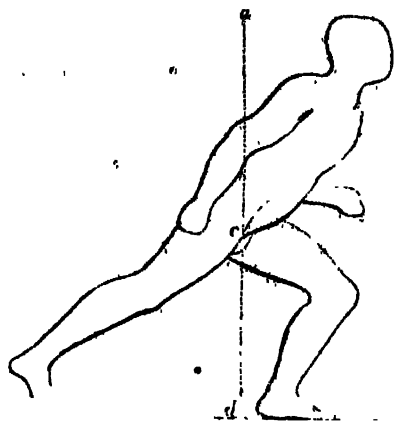
Fig. 4.



represents a man in the act of running, where the line *a c d*, which passes through the centre of gravity, lies far behind the foot (*b*), the base of support, and being therefore unsupported, the man would fall backwards. In fact, no person can be in the position of Flaxman's figure whilst in the act of running without falling to the ground. The same fault is observable in (*Fig.* 5) another of Flaxman's designs, intended to represent a man just on the point of running: the line through the centre of gravity falls behind the foremost foot, and consequently if the hinder leg be raised, the man must inevitably tumble backwards.

In running, the length of a step increases much more rapidly than the time of it decreases, and hence we chiefly gain by passing over a greater space in a given time. Messrs. Weber found that when the time of the step was 0″.301, the length was about one foot, and when the time was diminished to 0″.268, the length of step was about five feet, so that with a decrease of only thirty-three thousandths of a second the velocity increased by more than a five-fold proportion. In fact the time of a step in running differs scarcely in a perceptible manner from that of quickest walking, it being nearly equal in both cases to the duration of a semi-oscillation of the leg.

Fig. 5.

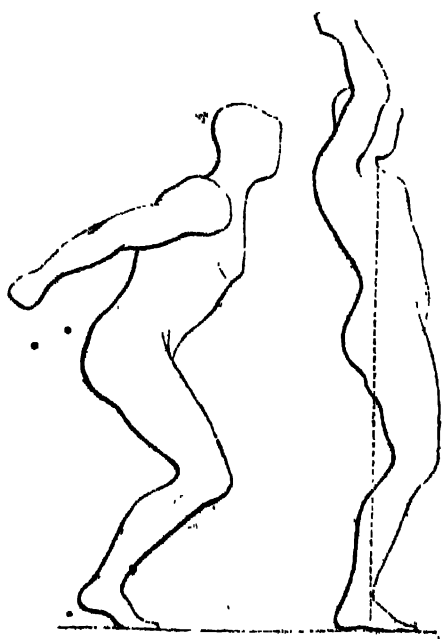


Running requires a vastly greater expenditure of muscular force than walking, and cannot be long maintained without completely exhausting the strength.

It appears that a man named Jackson very lately ran a mile in four minutes and fifty-four seconds, so that he passed over rather more than eighteen feet in a second, or at the rate of 12·3 miles in an hour, a velocity very rarely exceeded.

Leaping, Springing, or Jumping.—In leaping, the object to be attained is different from that of running. In the latter we aim at taking the longest step in the least possible time, but in the former we want to take the longest possible steps without regard to their duration, and the longer the step the greater will be the time in taking it. In leaping with both legs at the same time, as in *Fig.* 6 and *Fig.* 7, there must be

Figs. 6 & 7.



a pause between each step, and this is not resorted to as a mode of progression, but rather to accomplish a

single step of great length; for the expenditure of muscular action is so enormous, that a succession of steps with both legs, alternately resting on the ground and lifted from it together, is rarely had recourse to, except for such purposes as leaping across rivulets, or narrow chasms, descending abrupt surfaces, &c.

When the object in view is to maintain a mean uniform progressive motion by leaping, the legs interchange their offices alternately as in running. The step in leaping, like that in running, may be divided into two periods, during the first of which one leg rests on the ground, supports the body, and propels it upwards and forwards; and during the second period, both legs swing in the air simultaneously. The undulations of the centre of gravity are greater in leaping than in walking or running, in consequence of the body being projected higher into the air, whereby the swinging leg is enabled to pass beyond the vertical line through the centre of gravity, and to perform the whole of its arc of oscillation before it is placed on the ground; whereas in running it is arrested at the instant when it arrives at the vertical position; and this constitutes the principal difference between the two motions.

If we begin the step, as in running, at the moment when the hinder leg, being fully stretched, projects the trunk upwards and forwards, and itself quits the ground, we find the other leg still swinging, which it continues to do for a much longer time than in running; after the latter has reached the earth, it rotates round the ball of the foot, and from being in an oblique position in front of the body, it comes into a similar one behind it, the two extreme oblique positions forming equal angles with the vertical. The first-mentioned leg has been all this time swinging, and so continues after the other has left the ground, and at length it comes to the earth obliquely, and rotates into the position with which we commenced our description.

As the swinging leg is suffered to perform an entire oscillation, it follows that the duration of the step is greater in leaping than in running, but in consequence of the greater length of the step, the velocity in the former is not so much less than in the latter as might have been expected. For example, let us suppose the length of the step in running, as is found by experiment, to be five feet, and the time of the step to be 0″·268, also the length of the step in leaping to be 6·485 feet, the corresponding time of which is 0″·404, then the velocity in running will be to the velocity of leaping as $\frac{5\cdot}{0\cdot268}$ to $\frac{6\cdot485}{0\cdot484}$, or as 1 to 0·718. Thus we observe the velocity of leaping to be less than that of running, both being estimated at the greatest speed; but then in leaping, the steps, being taken in greater time, do not excite the pulsations of the heart, or increase the number of respiratory movements so much as in running; and persons when fatigued with running find that if they wish to relieve the respiratory and arterial systems without materially slackening their speed, they can accomplish this object by converting the running into a leaping movement, better than by converting the quick into a slow running.

It is found much safer to descend the sides of steep hills with rapidity by means of small leaps than by running, because in the former the foot may be placed on and pressed against the ground in advance of the trunk, and so arrest its motion and prevent the body from falling to the ground, which cannot be done in running.

The movement in leaping, being of all the foregoing motions most under our control, is varied by the peculiar manner in which the step is made, and is therefore not so susceptible of accurate demonstration as those of walking and running.

The laws which regulate the locomotion of man admit of mathematical analysis, and those of walking and running are found to be as fixed as those which govern the solar system. The reader who wishes to pursue this subject will find the mathematical details in the valuable work of Messrs. Weber, already referred to, or the result of their labours condensed in the article 'Motion,' in Todd's 'Cyclopædia of Anatomy and Physiology.'

THE PRODUCE OF THE APPLE AND PEAR.

In some of our former numbers there have been slight notices of apples and apple-growing; such as the sketch of the apple-harvest in Normandy, in No. 541. But there are a few additional matters, which may be here grouped together, respecting the various uses which the apple and pear trees, considered in their complete state, render. We place the two in conjunction, because they are intimately related in their botanical features.

The apple-tree, considered in respect to its timber, is not of great importance, though the wood is hard and fine-grained. Probably the pieces in which it can be obtained are not large enough to be extensively useful. The bark affords a yellow die; the leaves of some of the species are eaten by horses, cows, sheep, and goats; verjuice, a substitute for vinegar, is made from the sourest kind of crab-apple. It is said that pomatum was first made of apple-pulp, hog's lard, and rose-water, and that it derived its name from *pomme*, the French name for apple.

It is, however, as an edible fruit, and as a material for cider, that the apple is most known and valued. Apple-jelly is used as a medium for preserving Siberian crabs and other fruits. In Norfolk, dried apples, under the name of *beaufins*, are much esteemed. The apples are dried slowly in bakers' ovens after the bread has been drawn, being occasionally taken out and pressed with the hand to flatten them: they are rendered thereby perfectly soft, of a rich brown colour, and are sent up to London, where they may generally be seen in the shops of the dried-fruit sellers. A somewhat similar preserve, or marmalade, is made in France, and known by the name of *raisiné composé*. This favourite Parisian sweetmeat is made by boiling *must*, or new wine, down to one half, skimming it continually as fresh scum rises, and straining off the liquor. A number of apples are then pared, cut into quarters, and put into the liquor. The mixture is simmered gently, and stirred with a long wooden spoon, till the apples become thoroughly dissolved in the liquor; and the resulting jelly, or marmalade, forms a very agreeable and wholesome food, or rather confection. In some parts of France, after the must has been boiled, skimmed, and strained, and before the apples are added, it is allowed to settle for twenty-four hours in a cool place; a saline scum rises, containing tartaric acid, resulting from a lower degree of ripeness in the grapes from which the must had been produced, and requiring to be removed before the apples are put into the liquor. The best raisiné composé, made in Burgundy, has a sweetness slightly flavoured with acidity, somewhat like a mixture of honey and lemon. It is very extensively eaten in France, as a substitute for butter, spread upon bread, in the same manner as marmalade is in England and Scotland. In Italy it is used to flavour maccaroni and other dishes. Sometimes a spurious kind is made by substituting honey-water for the wine.

The liquors made from the fruit of the apple are much esteemed in every country where the fruit ripens favourably. Apple-water is a refreshing drink in cases of fever and inflammation. An apology for cider is made in some parts of France, by simply adding water and sugar to apple-juice. The North Americans distil a spirit from cider called cider-brandy; they also make a drink called pomona-wine, by adding a gallon of brandy to six gallons of new cider after being racked off: when kept for several months, it is said to form a good substitute for wine. Indeed the United States present many examples of the attention paid to the apple and its preparation into food and drinks; for the apples are there made into preserved apples, apple-butter, apple-sauce, dried apples, cider, pomona-wine, and other preparations; and the ceremony, or social "frolic," *of apple-paring*, by which the fruit is brought into the proper state to be acted on, forms a kind of harvest-home, of which a lively description by an eye-witness may be found in our No. 359.

In Ireland cider is made from various kinds of apples mixed together; and as many of these are of a sour kind, the cider has more acidity than that made in England, and appears to be valued on this account. In Scotland the making of cider is hardly known. In Normandy cider has been made from very early times; the kind produced is sweet, but is more heady, and less fitted for keeping, than English cider. In America cider is chiefly made and drunk in the northern provinces,—such as New England. In this latter country the fruit is suffered to remain on the tree till thoroughly ripe, and is then gathered by hand; or if the trees are shaken, care is observed to lay Russian mats on the ground for receiving the apples, to prevent them from being bruised; and after the apples have been ground to a pulp, they are allowed to remain a week or ten days in that state before pressing.

In England the chief counties for cider-making are Herefordshire, Worcestershire, and Devonshire, and so great is the importance attached to the manufacture in these counties, that the peasantry have some curious customs indicative of their respect for the apple-tree. In Devonshire, it is said that the orchard-farmers sometimes, on Christmas Eve, take a large bowl of cider with a toast in it; and carrying it to the orchard, salute the apple-trees with much ceremony, sprinkling the branches with the cider, and singing some such a chorus as thus:—

"Here's to thee, old apple-tree,
Whence thou mayst bud, and whence thou mayst blow;
And whence thou mayst bear apples enow.
Hats full! Caps full!
Bushel—bushel—sacks full!
And my pockets full too!
Huzza!"

Brand, in his 'Popular Antiquities,' gives descriptions of other customs of the kind, of which the following will suffice as an example:—The farmer and his men go out into the orchard after supper on the eve of Twelfth Night, with a large milk-pan full of cider, having apples pressed into it; out of this each person in company takes an earthen cup full of liquor, and, passing along under the trees, neglects those which are not good bearers, but stops at the most fruitful trees, and sings to them;—

"Health to thee, good apple-tree,
Well to bear, pocketfulls, hatfulls,
Peckfulls, bushel-bagfulls"—

after which he drinks part of the cider, and throws the rest at the favourite trees.

The series of operations connected with the manufacture of cider on a large scale in the counties just named, have been described in No. 210.

The *pear-tree* so far differs from the apple that its wood is employed for many purposes in the arts. The wood of the wild pear is heavy, strong, compact, fine-grained, and slightly tinged with red. It takes readily a deep and permanent black dye, and is in that state so much like ebony as to be scarcely distinguishable from it. When dyed or stained black, it is much used as a veneer for flat picture-frames, being laid upon a foundation of deal or some other cheap wood. Gerard, when speaking of this wood, said that it "likewise serveth to be cut into many kindes of mouldes; not only such prints as those figures are made of [by which he probably meant engraved wood-blocks], but also many sorts of pretty toies, for coifes, brest-plates, and such like, used among our English gentlewomen." The "brest-plates" here alluded were probably analogous to the whalebones and steels of modern corsets. The pear-wood, from being hard, homogeneous, easy to cut, and not likely to crack or to warp when dry, is fitted for the use of the wood-engraver; but box-wood is superior, and is used in its stead. It is used for many purposes by turners and pattern-makers. It forms excellent fuel and charcoal.

As with the apple, so with the pear, the fruit is the portion of the tree which is most valued. Mr. Loudon,* quoting principally from the 'Nouveaux Cours d'Agriculture,' gives the following details as to the modes of preparing pears for the table on the Continent:—In France and Belgium it is very customary to dry pears in ovens, in which state they form an article of commerce both domestic and foreign, and will keep good for a whole year. They are also dried in this manner in Russia; and when stewed they are eaten as part of a dessert, or as a substitute for pies and puddings. Pears are dried in France in two different ways. The first of these, for family use, is effected by putting them unpared into an oven after the bread is drawn, either on the bricks or on raised frames of tin or boards. The pears are put into the oven two or three times, according to their size and the heat of the oven; and care is taken not to have the heat so great as to burn them, nor to allow them to remain in so long as to become hard. Sweet mellow pears of a middle size are the best fitted for this purpose; and when properly prepared they may be kept in bags in a dry place for several years. The second mode of preparing the pears has relation to those sold in boxes in the grocers' shops. The pears are gathered before quite ripe, and with attention to the preservation of the stalk. They are then parboiled in a little water, peeled, and placed on dishes with the stalks uppermost. In this state a kind of syrup runs from them, which is carefully poured off and set by. They are next placed on raised frames, put into an oven after the bread has been drawn, and left there twelve hours. Being then taken out, they are steeped in the syrup, which for this purpose has had sugar, cinnamon, mace, and a little brandy added to it. The pears, when taken out of the syrup, are again placed in the oven, which is heated to a somewhat lower degree than before. These operations of alternately steeping and drying are repeated three times, and are finished by putting

* In mentioning the name of this eminent and lamented gentleman, we wish to acknowledge the assistance which his numerous agricultural and botanical works, especially the 'Arboretum Britannicum,' have rendered us in preparing slight sketches from time to time on those subjects; works by which, while benefitting readers at large, he undermined his own health and strength.

the pears for the fourth time into an oven, where they are left till quite dry. These processes, if properly conducted, give to the pears a clear pale brown colour, and a fine half-transparent fleshy texture. They are then arranged in boxes lined with white paper, and are thus brought to market. They will keep good for three years, but are considered in the finest state during the first year.

The juice of the pear is made into *perry* much in the same manner as that of the apple is made into *cider*. The description of the mode of making cider on a large scale, in No. 210, will suffice likewise for perry; but it may be well to state the manner in which the process may be conducted on a small scale for family use, as described by Professor Donovan, in Lardner's 'Cyclopædia.'

This writer states that the superabundant apples from a moderately large garden may be economically converted to this use, and without a great deal of trouble. A tub is to be procured, made of strong staves, and firmly put together, so as to bear the strokes of a heavy pounder or crusher: the diameter may be about eighteen inches, and the height the same. The pounder is made of any hard wood, and shaped something like a loaf of sugar, with a handle inserted at its apex. A common square clothes-press will do very well to give the requisite degree of pressure.

With these simple implements the process is conducted thus:—The apples are thrown into the pounding-tub a few at a time (for if many be operated on at once, the crushing will be imperfectly effected), and pounded well, which, if the pounder be heavy, will be done in a few strokes. A few others are then thrown in, and similarly pounded; and so on till the quantity collected impedes the further crushing, and the pulp is then transferred to any other wooden vessel. The pulp being thus produced, the next point is to express the juice from it. For this purpose it is put into a canvas bag, placed in a tin tray in the press, and the press worked till all the juice is forced out: if the screw be urged suddenly, the juice will be thick and muddy; but if gradual and well adjusted, it will be clear and transparent. A small pipe leads from the front of the tray into a vessel beneath, and through this pipe the juice passes after being pressed out of the press.

The juice thus procured may be conveniently fermented in a cask set upright on one of its ends, having the bung-hole (if any) well corked up, and another hole bored in the head. Through this hole the apple-juice is admitted into the cask, where it may be left to ferment at the natural temperature of the air, should this be not under 60° in the shade, or near a fire in cold weather. After some hours the fermentation commences, the head of yeast rises up through the cork-hole, and the rim of the cask prevents the yeast from flowing over. The fermenting of the juice is not designed to give an alcoholic quality; but to exchange some of the sweetness of the apple for the sharp briskness of the carbonic acid generated by the fermentation. Cider is considered in its best state when the three qualities of sweetness, sharpness, and acidity are so equally balanced that no one of the three predominates. As soon as the cider has ceased to ferment, a hole is bored with a gimlet near the bottom of the cask, and the liquor flows out into another cask, which is then well bunged up. After remaining thus two or three weeks, it may either be bottled off or kept in draught for use. "This apparatus," says Mr. Donovan, "will be found capable of doing a greater quantity of work than might be anticipated. One man employed in pounding the fruit, while another presses and otherwise assists, will produce ten gallons of juice in the day. . . After the apples have been pressed, they may be economically pounded a second time, when they will afford a second product of juice."

La Vendée in 1793.—Only two great roads traversed this sequestered region, running nearly parallel, at a distance of more than seventy miles from each other. The country, though rather thickly peopled, contained, as may be supposed, few large towns; and the inhabitants, devoted almost entirely to rural occupations, enjoyed a great deal of leisure. The noblesse or gentry of the country were very generally resident on their estates, where they lived in a style of simplicity and homeliness which had long disappeared from every other part of the kingdom. No grand parks, fine gardens, or ornamented villas; but spacious clumsy châteaux, surrounded with farm offices, and cottages for the labourers. Their manners and way of life, too, partook of the same primitive rusticity. There was great cordiality, and even much familiarity, in the intercourse of the seigneurs with their dependants: they were followed by large trains of them in their hunting expeditions, which occupied so great a part of their time. Every man had his fowling-piece, and was a marksman of fame or pretensions. The peasants resorted familiarly to their landlords for advice, both legal and medical; and they repaid the visits in their daily rambles, and entered with interest into all the details of their agricultural operations. From all this there resulted a certain innocence and kindliness of character, joined with great hardihood and gaiety. Though not very well educated, the population were exceedingly devout; though theirs was a kind of superstitious and traditional devotion, it must be owned, rather than an enlightened or rational faith. They had the greatest veneration for crucifixes and images of their saints, and had no idea of any duty more imperious than that of attending on all the solemnities of religion. They were singularly attached also to their curées, who were almost all born and bred in the country, spoke their *patois*, and shared in all their pastimes and occupations. When a hunting-match was to take place, the clergyman announced it from the pulpit after prayers, and then took his fowling-piece and accompanied his congregation to the thicket.—*Edinburgh Review.*

The Wandering Jew.—This is a vulgar error of considerable antiquity. Dr. Percy tells us that it obtained full credit in this part of the world before the year 1228, as we learn from Matthew Paris. In that year it seems there came an Armenian archbishop into England to visit the shrines and reliques preserved in our churches; who, being entertained at the Monastery of St. Albans, was asked several questions relating to his country, &c. Among the rest a monk, who sat near him, inquired "if he had ever seen or heard of the famous person named Joseph, who was so much talked of, who was present at our Lord's crucifixion and conversed with him, and who was still alive in confirmation of the Christian Faith." The archbishop answered, that the fact was true; and afterwards one of his train, who was well known to a servant of the abbot's, interpreting his master's words, told them in French, that his lord knew the person they spoke of very well; that he dined at his table but a little while before he left the East; that he had been Pontius Pilate's porter, by name Cartaphilus: who, when they were dragging Jesus out of the door of the Judgment Hall, struck him with his fist on the back, saying, "Go faster, Jesus, go faster; why dost thou linger?" Upon which Jesus looked at him with a frown, and said, "I, indeed, am going; but thou shalt tarry till I come." Soon after he was converted and baptized by the name of Joseph. He lives for ever, but at the end of every hundred years falls into an incurable illness, and at length into a fit of extasy, out of which, when he recovers, he returns to the same state of youth he was in when Jesus suffered, being then about thirty years of age. He remembers all the circumstances of the death and resurrection of Christ, the Saints that arose with him, the composing of the Apostle's Creed, their preaching and dispersion; and is himself a very grave and holy person. This is the substance of Matthew Paris's account, who was himself a monk of St. Albans, and was living at the same time this Armenian archbishop made the above relation. Since his time several impostors have appeared at intervals under the name and character of the Wandering Jew.—*Brand's Antiquities, new edition by Sir H. Ellis.*



[Old House at Warwick.]

WARWICK.

Warwick, the county town of Warwickshire, is situated on a rocky eminence, on the north-west bank of the Avon, but nearly a quarter of a mile distant from the river, Warwick Castle and the grounds belonging to it being interposed. Warwick Castle has already been described (see 'Penny Magazine,' No. 22, vol. i. p. 177). Warwick is not a large town, but is clean, well paved, and well lighted with gas, and has altogether an air of neatness and respectability. Most of the houses are of comparatively modern construction, a great fire which occurred in 1694 having swept away more than one half of the old town. Of the ancient timber houses which remain, the one represented above affords an instance of the picturesque manner in which the diagonal timbers are frequently arranged. On approaching Warwick by the road from Leamington, which crosses the Avon by a handsome stone bridge, the lofty towers and battlements of Warwick Castle, the spire of the church of St. Nicholas, and the tower of St. Mary's, are seen, and present the most picturesque view which can be obtained of the castle and town conjointly.

Warwick is included in two parishes, St. Mary's and St. Nicholas's, and has two parish churches.

St. Mary's church, originally built at the expense of the Earls of Warwick, and completed in 1394, was formerly collegiate, but the constitution was changed at the dissolution by Henry VIII. A great part of the building was destroyed by the conflagration of 1694. The nave and transept were rebuilt and completed in 1704; the architecture [illegible] a mixture of Gothic and Roman, incongruous it [illegible], but not destitute of magnificence of effect. The choir, the chantel, and the Beauchamp chapel are [illegible], and in much better taste. The choir has a stone [illegible] of elaborate workmanship. The chancel is a beautiful specimen of perpendicular architecture; the east front, in particular, is rich in effect, from the elegance of the details, though the arrangement is simple. The Beauchamp chapel (properly St. Mary's chapel) adjoins the chancel on the south. It was erected by the executors of Richard Beauchamp, Earl of Warwick, according to the directions of his will. It was begun in 1443, but was not finished till 1464. The total expense was 2481*l.*, a sum probably equal to not less than 40,000*l.* of our present money. The exterior is a fine specimen of the later pointed style, in good preservation. The interior is highly but elegantly ornamented; the ceiling is of stone, richly carved; the floor is of black and white marble; the great east window is filled with painted glass, displaying figures, coats of arms, devices, &c.; the other windows are not painted, except in the tracery, which is somewhat damaged. The monument of the founder, for the reception of which the chapel was especially built, is near the centre of the principal apartment, which is fifty-eight feet long by twenty-five feet wide. The monument is an altar-tomb of grey marble, on the slab of which lies the figure of the earl, of the size of life, in brass gilt, and resting on a brass table. All the parts of the tomb are highly ornamented: it is a monument of great elegance and stateliness. This Richard de Beauchamp, Earl of Warwick, whose remains lie beneath the tomb, succeeded to the title on the death of his father Thomas, the eleventh earl, in 1401. He distinguished himself by taking the standard of Owen Glendower in battle, and fought against the Percies at the battle of Shrewsbury. In 1425 he was appointed regent of France, during the Duke of Bedford's absence in England. In 1428 he was summoned home, to become governor to Henry VI., then in the seventh year of his age, which office he retained till 1437, when he succeeded the Duke of York as regent of France. He died at Rouen in 1439. His body was brought to England in a stone coffin, and placed near the monument of his father till his own chapel and tomb were sufficiently advanced to be fit for its reception, which was in 1450.

There are several other monuments in the Beauchamp Chapel: one of the most splendid is that of the Earl of Leicester, the favourite of Queen Elizabeth.

The living of St. Mary is a vicarage, of the clear annual value of 300*l.*, with a glebe-house. It is in the

rural deanery of Warwick, and archdeaconry and diocese of Worcester.

The church of St. Nicholas was built in 1780. The spire is low, and the church has no claim to praise for its architecture, which is Gothic. The interior is neat, but not spacious. The living is a vicarage, of the clear annual value of 218*l.*, with a glebe-house. It is in the rural deanery of Warwick, and archdeaconry and diocese of Worcester.

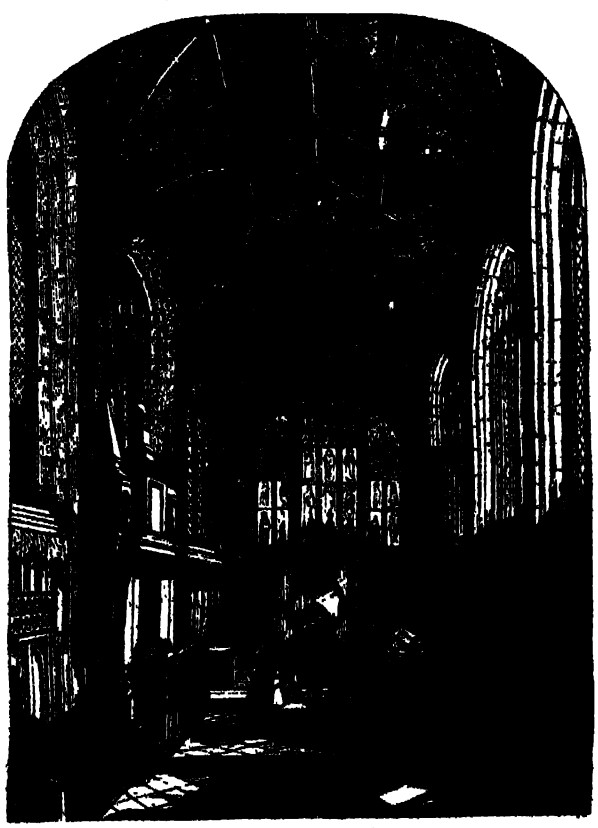
The Court House, or Town Hall, a respectable stone building, was erected about 1730, at the expense of the corporation, for which, as a misappropriation of the corporation funds, the authorities were summoned by the Court of Chancery, and their powers suspended till 1738. The County Hall is a handsome building, with a stone front and Corinthian columns. The interior is spacious; and there is a large but plain stone building adjoining the Hall for the accommodation of the judges at the assizes. The County Gaol adjoins the County Hall on the north. It is a modern building, surrounded by a strong wall twenty-three feet high. On the opposite side of the street, not far from the gaol, is the County Bridewell, which is also modern. The Market-house is a substantial stone building. The open part below is appropriated to those who attend the market. The rooms above are used as the Museum of the Warwickshire Natural History and Archæological Society, which is probably superior to any collection of the kind in a town of similar size.

Leicester's Hospital, an ancient structure, was originally the hall of the two guilds of Warwick, the Guild of the Holy Trinity and the Guild of St. George the Martyr, which were founded in the reign of Richard II., and afterwards united into one. After the dissolution of this fraternity by Henry VIII., the building became the property of the Earl of Leicester, who converted it into an hospital for twelve impotent men, and one master, who was to be a professor of divinity. The endowment at the time was valued at 200*l.* a year, but now worth more than 2000*l.* a year. The number of brethren has been increased to twenty-two, and the allowances augmented. Preference is given to soldiers who have been disabled in the public service. The ancient buildings have been altered to suit the increase in the number of the inmates and the change in the value of the endowment. There is a Dispensary for supplying the sick poor with medical and surgical advice and remedies.

A free grammar-school was founded at Warwick by Henry VIII., and endowed with property which belonged to the dissolved establishments. The school is open to all boys of the town, but an entrance fee of 1*l.* 11*s.* 6*d.* is required, and a half-yearly payment of 5*s.*

Warwick is a municipal and parliamentary borough. The boundaries of the municipal borough are co-extensive with those of the parishes of St. Mary and St. Nicholas; they extend beyond the town from a mile to five miles in different directions, and include an area of 5360 acres. The population of the borough in 1831 was 9109; in 1841 it was 9775. The population of the town and suburbs in 1831, was 9000; in 1841, it was about 9650. The borough was formerly governed by twelve aldermen, of whom the mayor was one. By the Municipal Reform Act in 1835, it was divided into two wards, with six aldermen and eighteen councillors.

As a parliamentary borough, Warwick has returned two members to the House of Commons ever since the reign of Edward I. The population of the parliamentary borough in 1841 was 9124. The number of voters on the list in 1839-40 was 977. The elections for the southern division of the county are held at Warwick.



[Beauchamp Chapel.]

The assizes and quarter-sessions for the county are held at Warwick. Quarter-sessions for the borough are also held, and there is a Court of Record for personal actions under 40*l*.

Manufactures of worsted, cotton, and lace are carried on to some extent. Many of the tradesmen have shops at Leamington as well as at Warwick. The Warwick and Napton Canal, which is connected with the Birmingham and London Canal, passes near the town. The market, which is on Saturday, is well supplied and well attended; and there are twelve fairs yearly, chiefly for cattle; also a statute fair for the hiring of servants, and a cheese-fair. There is one weekly newspaper, the Warwick Advertiser.

Warwick is an ancient town, but does not appear to have been a Roman station. In the Saxon times it was favoured with the patronage of Ethelfleda, daughter of King Alfred, and at this time the keep or dungeon was constructed.* The castle was built in the reign of Edward the Confessor, and became "a special strong hold for the midland part of the kingdom." After the Norman Conquest, the castle was enlarged and the fortifications strengthened. This castle was given by the Conqueror to Henry de Newburgh, whom he created Earl of Warwick. In Domesday-Book the town is called a borough, and is stated to contain 361 houses, of which 130 belonged to the king, 112 to certain barons, and 19 to burgesses, who enjoyed them "with soc and sac (with entire possession), and all customs as in the days of Edward the Confessor." Several religious establishments arose about this time. The paving of the town and the building of the walls commenced in the latter part of the reign of Edward I. The execution of Piers Gaveston, the favourite of Edward II., on Blacklow Hill, under the direction of Guy, Earl of Warwick, and Thomas, Earl of Lancaster, is described in 'Penny Magazine,' vol. i., p. 177.

The appearance of the town in the reign of Henry VIII. is thus described by Leland:—"The town stands on a main rocky hill, rising from east to west. The beauty and glory of it is in its two streets, whereof the High-street goes from east to west, having a right goodly cross in the middle of it, and the other crosseth the middle of it, making a quadrivium, and goeth from north to south." The High-street is still a spacious and handsome street, but the cross is no longer there. The walls too which surrounded the town have disappeared, except a fragment or two.

The corporation received its first charter in 1572 (1 Philip and Mary). Another was granted by Charles II., in 1694, and was confirmed and modified by another in the reign of William III.

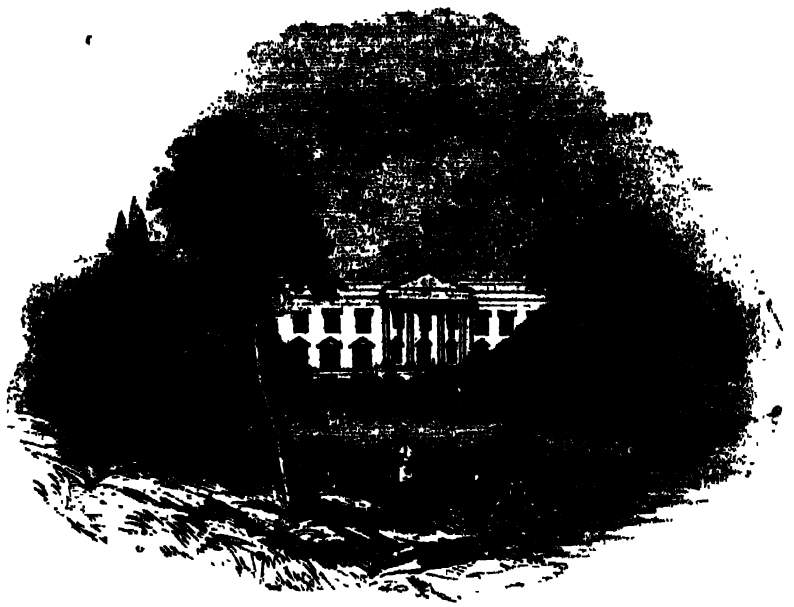
During the civil war of Charles I. the town and castle was held by Robert, Lord Brooke, for the parliament. The castle was garrisoned, and was besieged by the royalists, and several skirmishes took place. Lord Brooke showed his determination to die rather than surrender by hanging out a Bible and a winding-sheet on the tower of the castle. After a fortnight, the royal army was obliged to retreat. The last event of importance which occurred to the town was the great fire of 1694, which has already been mentioned.

Railroads in England and America.—The comparatively small cost at which the greater part of the railways in the United States have been constructed, is the result of a variety of circumstances concurring to that end. In the first place, the projectors are spared all the expenses attendant upon parliamentary contests; there are not any adverse interests to be bought off, nor any exorbitant claims for land to be satisfied. The presence of a railroad in any district is felt to bring with it advantages to the owners and occupiers of the soil, so great as to make it their interest to promote the undertaking by a cession of the land which is required, either as a free gift, or upon terms proportioned to its actual value in the market. Any one who has been engaged in the construction of a railway in England will readily understand how materially these favourable circumstances must aid in the economical performance of the work. Another most important thing for producing this desirable end is the fact that travellers in the United States are well satisfied if carried at the rate of 15 miles per hour, while we in England feel greatly aggrieved if we do not accomplish 25 miles per hour, and in some cases even that rate of rapidity fails to satisfy. To accomplish the slower rate, it is not necessary to reduce the line so nearly to a level as where greater speed is required, and consequently much of the expense of excavating and embanking, indispensable in England, is avoided. This slower rate, again, makes it practicable to use with safety curves of much shorter radius than are admissible at higher velocities. The economy resulting from this comparatively low speed, and the manner in which it admit of gradients and curves that would otherwise be inadmissible, will be made plain by inspection of the following table, which rests upon the observations of Mr. Nicholas Wood, and from whose valuable work on railroads it is taken:—

Rate of speed in Miles per hour.	Load in Tons that can be drawn by a Locomotive Engine of ordinary power.
10	250
12½	184
15	138
17½	106
20	83
22½	65
25	50
27½	38
30	28

Thus an engine that at 15 miles per hour would draw 138 tons weight, would at 25 miles per hour draw no more than 50 tons; and by adding another 5 miles per hour to the speed, its capability would be lessened to 28 tons. It must be evident that if power is exhausted by the speed attained, the same effect must be produced in order to overcome a difference of level, and it has been ascertained that to master an acclivity of 1 foot in each 300 feet of distance requires a tractive force twice as great as is required to move the same load at the same speed along a dead level railroad. Where the acclivity amounts to 1 in 150, the force is required to be three times as great as on a level; a rise of 1 in 100 requires four times, and a rise of 1 in 75 a force five times as great as on a level. If, then, the locomotive engines employed in America are of the same horse-power as those employed in England, a greater portion of that power will be expended in overcoming the greater difference of level, and the greater amount of friction caused by the smaller radii of curves; and the deficiency of power thus caused can only be made good by travelling at a less rate of speed. Another cause of comparative cheapness of construction is the very low price of timber, and the great extent to which it is applied in lieu of masonry in the construction of bridges and viaducts. Considerable portions of some of the American railways are supported upon piles, the whole structure consisting of a very simple and cheap, though strong framework or scaffolding. Wood is also used very extensively instead of stone for supporting the rails; and on many lines the rails themselves consist of beams of timber, the upper surfaces of which are covered with thin iron plates, for the sake of obtaining an iron surface at the least possible cost. In many cases great economy is effected in the locomotive expenditure by the use of wood, instead of coke, for fuel in the locomotive engines. On this subject of comparative cheapness, it may further be stated, that nearly all the railroads hitherto executed, or which are in progress of construction in the United States, consist of only one line of rails, with sidings, or 'turn-outs,' at intervals.

* Considering the different condition of the two countries as respects the possession of capital, it must be apparent that had the citizens of the United States aimed at the same high degree of perfection in railway works as has been attained in England, a very few only of the various lines now in use in America could have been completed. The degree of commercial activity which these works have tended so powerfully to produce, sufficiently attests the wisdom of the course pursued, and may at no very distant period prove instrumental in providing means for more perfect undertakings, should such be demanded.



[Claremont.]

RAMBLES FROM RAILWAYS.

The River Mole.—No. III.

[Concluded from p. 119.]

From Leatherhead there is a by-road over Platsome Green, keeping the river a little on the left, to Stoke d'Abernon; and there is another leaving the river on the right across a corner of Fetcham Common: they meet at Stoke by the old water-mill; both are pleasant—indeed, in that respect, there is little to choose between them. Our river we must no longer expect to follow closely, its way, during most of the remainder of its course, lying through private enclosures.

We ought to have mentioned sooner that the banks of our river are everywhere adorned with a profusion of flowers; and in spring abound to a remarkable degree with cowslips, a flower that is found in unusual plenty throughout Surrey. Nor must we omit to notice, that in many of the villages a graceful May-day custom prevails connected therewith. During the last few days of April, the village children go about the meadows, and collecting all the cowslips they can find, form them into garlands, chaplets, &c., and on May-morning they assemble, and uniting in bands, carry their garlands, arranged commonly on two hoops crossed vertically and fixed on poles, about the neighbourhood; and very pretty they look. They have nosegays of other flowers also, but cowslips (or paigles, as they call them) are the chief; and with these their bonnets and caps are also trimmed. We have seen some of these little processions that looked as charming as those troops of Italian children carrying flowers, which Mr. Uwins paints so delightfully. We have not seen this Surrey custom noticed anywhere; in Hone's 'Every-day Book' there is an account of one something similar, in the neighbourhood of Northamptom. We do not know whether the practice is falling off, but it is not extinct—last May-day we saw many of these little companies at as short a distance from London as Carshalton and Beddington; certainly there is no other relic of May-day near London of anything like so graceful a form. The cottages too are for the nonce decorated with similar ornaments.

Stoke church is one of those little churches situated within a park, of which there are so many in every county, and which always have so stiff, and lordly, and exclusive a look. It stands by the river-side, and is a neat little building. The village consists merely of a few scattered houses. At Stoke we part from the downs by which the scenery has hitherto been so agreeably diversified. Our river now runs by Cobham Park, soon after quitting which it works another of those picturesque water-mills of which we have already passed so many along its banks. As this is the last we shall meet with deserving regard, we give an engraving of it below.



[Mill at Cobham.]

Cobham is quite a model of a sequestered country hamlet, and must be very refreshing in its quietness to the many anglers who escape to it from the noise of London. It contains some good houses, and, altogether, has a *weighty* look. In the churchyard there is a noble yew-tree, hollow from age, but still vigorous, and of large size. Cobham proper lies away from the great Portsmouth road, which runs through a sort of offset from Cobham, called Cobham-street;—a place that, prior to the opening of the South-western Rail-

way, had a lively bustling appearance, very different from that it now wears. The Mole about Cobham, as we have hinted, is much frequented by anglers, and has a promising look to a practised eye. Two bridges here cross it: the original bridge at Cobham was erected by Matilda, queen of Henry I., who assigned a piece of land in Cobham for its support. The cause of its erection was somewhat remarkable and characteristic of the age. One of her maidens being drowned in attempting to cross the ford here, the queen caused a bridge to be erected over the place *for the repose of her soul*. It lasted till 1782, when it was removed, being too small for the increased traffic. Matilda appears to have had an inclination for bridge-making, as, in addition to this at Cobham, the old one across the Lea at Stratford-le-Bow (which remained till within the last five or six years), and, we believe, one or two others, were erected by her.

Passing through Cobham-street, a by-road may be taken which will afford us frequent glimpses of our companion, although we can now no longer keep close beside it. The road is an agreeable one, and by Southwood we may join the river again, and proceed without much hindrance along its banks until we reach Esher Place. There is, however, another pleasant way by which, although we must part from our river awhile, we may still avoid the high road. This is, to take a road near Cobham mill, or one by the church, and thence by Fair-mile farm, and across Esher Common to Claremont. This shall be our course:—

> "A common overgrown with fern, and rough
> With prickly gorse, that shapeless and deform'd,
> And dangerous to the touch, has yet its bloom,
> And decks itself with ornaments of gold,
> Yields no unpleasing ramble"

says Cowper: and to us there is always something exhilarating in the fresh breezy air of an English common, with its strings of rosy-cheeked, ragged children; its flocks of noisy geese; its two or three scraggy horses and scrubby donkeys; its tall furze bushes, with their rich golden garniture that almost seems to *glow* from the contrast with the snowy whiteness of the linen hung across them to dry. Add to these, the wind-mill, the snug public-house, with its old tree and swinging sign; the cottages huddled up in a corner, opposite the pond, or loosely scattered where the first "enclosers" reared their mud huts; a gipsy encampment, if the common be a wide one; and, if it be a summer evening, the cricketers;—and you have pretty much what combine to make up "a Common," all England over. Yet, although alike, it is with a difference, and a common is always an object of pleasure to a pedestrian, unless there be the name only and not the thing. An enclosed common is an eyesore to every lover of English scenery.

Esher Common is without some of these features, but it has others that perhaps make amends; we must not, however, linger over it: here is Claremont before us, with its associations so blended with the national feelings and its various attractions. From Esher Common we enter the park, rich in

> "Old Patrician trees and Plebeian underwood,"

and abounding with game. The original mansion was built by Vanbrugh, the architect of Blenheim, and afterwards enlarged by the Earl of Clare (better known as the Duke of Newcastle), from whom it took its name. Dr. Garth published a poem on the occasion, entitled 'Claremont,' which is not destined, we believe, to be immortal. Claremont afterwards became the property of one or two other parties, and was at length purchased by Lord Clive, "the Conqueror of India," who had Vanbrugh's house pulled down, and he present one erected by Browne, celebrated in his day as a landscape gardener as well as an architect. It is in that syle of "Classic" of which so many specimens were produced about that time. It is said to have cost above a hundred thousand pounds. Lord Clive was not a favourite with the peasantry of the surrounding neighbourhood. Strange tales were circulated respecting his wealth, and exaggerated rumours of his Indian cruelties, and he was regarded with a feeling almost of horror by them.

After the death of Lord Clive, Claremont passed through several hands, and was finally bought by the government for the Prince Leopold and the Princess Charlotte. Her death occurred here, and produced a general gloom to which English history hardly describes a parallel. In the gardens, a summer-house to which the princess was very partial has been converted by the prince into a mausoleum, and dedicated to her memory. Claremont, as is well known, is a favourite retreat of Her who has so happily succeeded its late possessor in the affection of the nation. Since the accession of Leopold to the throne of Belgium, the visits of Victoria almost alone give life to the deserted mansion.

From Claremont we pass through Esher, a respectable but dull town, to Esher Place, which Thomson sings of as "Esher's groves

> "in sweetest solitude embrac'd
> By the soft windings of the silent Mole."

The grounds of Esher Place are very beautiful, and vistas are so arranged and garden seats so placed as to call attention to the loveliest prospects. At Esher Place Wolsey had a palace, a seat attached to the Bishopric of Winchester; and here it was that he retired after losing Henry's favour, and when he had been so ruthlessly despoiled of his other possessions by that rapacious monarch. His residence at Esher was marked by deep mortifications, and it is quite painful to read his earnest and importunate supplications for mercy. This is altogether a humiliating period of his life. Just before his fall his style of living was of almost unequalled magnificence; here he was obliged to borrow beds, linen, and even dishes; was straitened almost for the necessaries of life, and was only enabled, by the contributions of his chaplains, and of the followers who remained constant to him in his adversity, to pay the wages due to his inferior servants. "His faults lie gently on him!



[Wolsey's Tower.]

"This cardinal,
Though from an humble stock, undoubtedly
Was fashion'd to much honour."

The only remnant of Wolsey's palace is what is called Wolsey's Tower, in the preceding page. It stands by the side of the Mole, and is a red brick building, bearing in its general appearance, and also in its details, a strong resemblance to the older parts of Hampton Court: both, it will be remembered, were erected by Wolsey at about the same period. The tower is partly overgrown by ivy, but is in good preservation.

While the visitor is pondering on the character and fortunes of that extraordinary man, and trying, perchance, to recall to his imagination the strange times—big with so many mighty events—in which he lived; a train of carriages will, perhaps, dash along the railway viaduct that is carried just beyond the tower, and bring home to his mind with a startling vividness the wondrous changes that have come over our land since the fallen Cardinal here in bitterness of heart poured forth those affecting meditations on the mutability of all sublunary things.

Soon after passing under the railway, the river separates into two branches: the one runs by Ember Court and near Thames Ditton, so favourite a resort of Thames anglers; the other flows towards Moulsey Hurst, notorious in past days as the scene of many prize pugilistic encounters. The banks of the Mole are here low and marshy, and there is little more that is attractive in its course till its union with the Thames nearly opposite Hampton Court. Near its termination, we pass through the pretty rustic village of East Moulsey (or Molesey, as it was formerly spelt), which takes its name from our river. Here it works a large factory-like and most unpicturesque mill. The termination of the Mole is a noble one. From its mouth the Thames, with Hampton Court on the opposite bank, form a picture of surpassing beauty; that magnificent palace is nowhere seen to greater advantage.

Here, then, we part from our silent companion. The railway station stands invitingly near, but the rambler will prefer, if there be time, to cross the old wooden bridge to Hampton Court, and from thence stroll through the stately avenues of Bushy Park to Richmond, from which place he may—after a passing glance at the always new prospect from its hill—embark on board the Richmond steamer, and thus appropriately conclude his river excursion.

ON GUM, ITS SOURCES AND USES.

THE remarkable and useful substances which obtain the common name of *gum*, are a kind of mucilaginous, or more frequently resinous, juice which exudes through the pores of certain plants, chiefly of tropical climates, through natural clefts or artificial incisions, and hardens on the surface. A brief notice of three or four of these may be given.

Gum-Arabic, or gum-Senegal, is a very pure kind of gum, which exudes from a tree growing abundantly on the sandy soil of Egypt and Arabia, and in several other parts of Africa. The purest quality is brought in caravans to Cairo by the Arabs of the country near Mount Sinai, who sew it up in skin bags, and transport it on the backs of camels. The kind found in Western Africa obtains the name of the country, Senegal, which produces it; it is in larger masses, and of a yellowish or amber colour, but does not sensibly differ from the Egyptian gum in its chief properties. The gum exudes spontaneously in a liquid state from the trunk and boughs of the tree, and hardens by contact with the air and the heat of the sun; it begins to flow about December, immediately after the rainy season, near the flowering time of the tree; and afterwards, as the weather becomes hotter, incisions are made through the bark, to assist the passage of the juice. The best gum is brought over in oblong or roundish lumps, seldom larger than a walnut, nearly transparent, white or palish yellow, wrinkled, and of a shining fracture; it is so brittle as easily to be reduced to a fine powder, and is also perfectly insipid and inodorous.

The solvent power of gum-Arabic in water, and the adhesive liquid which it forms when so dissolved, are among the qualities which impart considerable value to it. It may be recovered again in the solid form in a remarkable way; for if it be dissolved in either hot or cold water, and then exposed to a gentle evaporation, the watery parts will pass off gradually, and leave the gum in a solid state, fit to be redissolved as before, without any of its properties being changed; there are but very few vegetable substances which resemble it in this respect. When in the dry and solid state, the gum will remain unaltered for any length of time; and the watery solution is one of the least changeable of all vegetable liquids.

This gum is employed for a number of valuable purposes in the arts and in medicine. It may be used either to suspend in water a number of substances which could not otherwise be kept equally diffused in this liquid, or as a means of cementing together a variety of articles of light work. For the last-named purpose it is peculiarly valuable, because a clean colourless cement, perfectly easy of application, may be prepared from the gum in a few minutes. It is also used in very large quantities by the calico-printers, to mix the colours and the ingredients in block-printing; and it forms the basis of crayons, of the cakes of water-colours, and of several liquid colours, of which common writing-ink is a familiar example.

There appear to be nutritive qualities in gum-Arabic; for in the countries where it is found it forms an important article of food, either by itself or mixed with rice or milk. An instance is on record in which the travellers of a large caravan, having consumed all their provisions by the time their journey was half over, kept themselves alive by eating the gum-Arabic which they were bringing as merchandize.

A few medicinal preparations contain gum-Arabic as one of their ingredients. It has a soothing effect from its mucilaginous character, and is employed sometimes to protect the system from the effect of any acrid and stimulating substance. In many instances it is employed not so much to produce any medicinal effect, as to enable other substances to mix together. Thus, it will give to balsams, resins, and fixed oils the power of mixing with water, and thus forming liquid medicines.

Taking all these uses together, the demand for gum-Arabic is very considerable. There are more than thirteen thousand cwts. imported into England yearly, or nearly a million and a half of pounds. It sells at from thirty to two hundred shillings per cwt., according to quality and to the relation between supply and demand.

Gum-mastich, another very useful product, differs from gum-Arabic in partaking more of a resinous nature. It is an exudation from the *pistachio lentiscus*, a tree growing in the south and south-eastern parts of Europe. The juice is obtained most abundantly, according to Tournefort, by making transverse incisions in the bark of the tree about the beginning of August, from which the mastich-gum exudes in drops, which run down and concrete on the ground, and are thence collected for sale or use. The time chosen for making these incisions is quite early in August, when the weather is very dry; and on the day after the cutting the mastich begins to appear in drops, which continue to

exude till the latter end of September. The tree is also raised in more northern parts of Europe; but no mastich has been obtained from it under such circumstances, probably because the weather is too cold to permit its formation. It is said to derive the name mastich from *masticare*, "to chew;" because it is thus used in the island of Scio, and by the Turks, especially the women, for sweetening the breath and strengthening the gums and teeth; and by producing a copious excretion of saliva, it is useful in some complaints.

Gum-mastich, in the commercial form in which it reaches us, is in small, yellowish, transparent, brittle grains or tears. A piece recently broken is quite transparent, but by exposure to the air it becomes on the surface rather powdery, and hence semi-transparent. Unlike gum-Arabic, it is wholly insoluble in water. It has a light agreeable odour, especially when rubbed or heated. When distilled with water, it yields a small portion of a limpid essential oil, very fragrant in smell, and moderately pungent in taste.

Mastich is used in small quantities as an astringent in various complaints; given either in substance, divided by different materials, or dissolved in spirits and mixed with syrup, or dissolved in water by the intervention of gum-Arabic. The wood of the tree is admitted into the Materia Medica of some foreign countries, being used in the preparation of medicines.

Jewellers sometimes mix mastich with turpentine and ivory-black, and lay it under their diamonds to give them a lustre. But the most extensive employment of this gum in the arts in this country is probably in the manufacture of mastich varnish, a highly valued varnish for oil-paintings and other purposes. The mode of making depends on the quantity manufactured at a time; but the following is given as one method of making it on a small scale:—Five ounces of powdered mastich are put into a bottle with a pound of spirit of turpentine, and kept in a warm bath till the mastich is dissolved; after which it is strained for use, and is laid on the picture or other article by means of a brush. The same varnish, somewhat modified by other ingredients, is used as a vehicle or liquid for colours in painting.

Gum-copal is a third variety, sharing with the two former many qualities in common, but more nearly resembling mastich than gum-Arabic. It is imported partly from North America and partly from the East Indies, and is a natural exudation from a large tree, hardening when exposed to the air.

The best copal is a hard, brittle, resinous substance, in rounded lumps of moderate size, easily reducible to fine powder, beautifully transparent; but often, like amber, containing parts of insects and other small extraneous bodies impacted in its substance. The colour of copal is a light lemon yellow, varying to orange; but when dissolved and spread thinly over any surface, the colour is scarcely perceptible, appearing only as a fine, hard, smooth, transparent glazing. These three qualities—hardness, transparency, and absence of colour—peculiarly fit this substance to be employed as a material for varnish.

Copal dissolves less readily than most other substances of this kind. Not only does it not dissolve in water; but even alcohol, which so readily dissolves most of the others, does not act on copal unless camphor is used. An alcoholic solution of copal is made by dissolving half an ounce of camphor in a pint of alcohol; adding four ounces of copal in small fragments; putting the whole into a glass vessel, and holding it over a lamp till the solution is complete. Copal may be dissolved in oil of turpentine by the intervention of some other of the essential oils, particularly oil of spike and oil of lavender. When united with drying linseed-oil, copal yields an oil varnish which, under the name of copal varnish, is very extensively used by coach-makers and other artisans.

Gum-Sandarach, or the *Sandarachè Arabum*, is a resinous juice which oozes out of the trunk and thick branches of several kinds of juniper, in warm countries, and particularly on the coasts of Africa, by incisions made during the heats of summer. The juice concretes into semi-pellucid, pale, yellowish tears or globules, somewhat resembling mastich, but rather larger. The gum-resin thus formed has a light agreeable smell, but very little taste. It will not dissolve in water, but does so in spirit and in essential oils. The small or common juniper yields very little sandarach; but its fruit yields oils, waters, salts, spirits, and extracts of some repute in medicine.

Like most of the other gums, sandarach is an ingredient in varnish. One sort of varnish is made by dissolving this gum in oil of turpentine. The gum is also used, when reduced to an impalpable powder, as *pounce*, to prevent paper from imbibing ink.

Gum-sandarach has been much employed in some foreign countries for medicinal purposes; but not to a great extent in England.

PALISSY.

There are certain destinies in the history of letters to which posterity appears to take delight in rendering posthumous justice. Burns, Savage, Chatterton, Otway, have received in our own times the sympathy so sparingly bestowed by their contemporaries; and the French poet Gilbert, though known only by a single elegy and his tragical end, bears a name consecrated by the veneration of his country. De Foe has been redeemed from the ignominy of the pillory by the admiration of every public in Europe; and were poor Oliver Goldsmith to rise from the grave, the debts, whose evil influence rusted the powers of his mind during his lifetime, would be readily defrayed by his admirers.

But this sort of posthumous influence is usually attained by writers of poetry and romance, whose spirit seems evermore vital, in the grasp maintained by their works upon the human mind. Towards the departed men of science we remain cold and ungrateful. The march of experiment is so rapidly progressive, that every half-century effaces the marvels of its antecedent; and newer discoveries blot out the memory of those to whom we are so largely indebted. At most, we estimate their achievements according to their insulated value. The difficulty and temporary value of the discovery is not taken into account. We overlook their toilsome days, their sleepless nights, their sacrifices of health and property; and measure our tribute of laurels or the palms of martyrdom with a thrifty and graceless hand. For though no subsequent fiction can dislodge from our affections 'Robinson Crusoe,' or 'The Vicar of Wakefield,' or 'Tam o'Shanter,' the lustre of such names as Davy and Farraday has "paled the ineffectual fires" of many whose lives were devoted, and not infructuously, to the advancement of science.

It is a source of bitter reflection on the capriciousness of fame, to peruse the biography of these early struggles in a career now so smooth; and though posthumous laurels afford a sufficiently hollow compensation for a life of toil, privation, and misery, the giver, if not the receiver, of such honours, is benefited by the tribute.

Listen to the history of Bernard Palissy; a name but little honoured in his own country, and in England all but unknown; though that of the father of several highly important discoveries, and a valuable link in the powerful chain of European philosophy.

Palissy belonged to the great epoch of the revival of the arts; yet, though an artist, lived a beggar and died a captive. While Francis I. was despatching messengers to Italy to engage the services of Benvenuto Cellini, Andrea del Sarto, and Leonardo da Vinci, a man of genius was starving in his own town of Saintes, to whom the fosterhood of his patronage would have afforded means of bringing to perfection certain arts of his invention, which have since afforded, and still afford, an important branch of commerce to France. But Palissy was a native artist; Palissy was undistinguished by the stamp, then essential, of an Italian origin or education. To foreigners were assigned the creation and embellishments of the new palaces; and to Palissy, obscurity and neglect. Born in some village, the name of which is unknown, in the diocese of Agen, about the year 1500, he followed the humble calling of a land-surveyor, to which, as he advanced in years, he added that of painting on glass.

At that period the art of porcelain-making was unknown. The discovery of Herculaneum and Pompeii have enabled us to determine the progress made by the ancients in the arts of pottery; and in the beginning of the sixteenth century the only manufactory of crockery which could pretend to the name of porcelain, was at Faënza in Italy; whither it is said to have been transported from China, by certain Venetian merchants. From this manufactory was derived the name of *faïence* or *fayence*, still used in France.

It happened that, in a visit to Agen, Palissy, the painter on glass, obtained a sight of a specimen of faënza, or of Oriental porcelain, which inspired him with the hope of discovering some sort of white enamel, by which earthenware might be encrusted; and from that moment he devoted fifteen years of his life to the pursuit of this single object. It appears a simple method to have proceeded at once to Faënzâ, and become a workman in the famous pottery. But means for so long a journey were probably wanting to the poor village geometer; and he accordingly gave to the enterprise all that was in his *power*, every moment of his days, and every faculty of his mind.

As a painter on glass, the art of mixing and fixing colours was well known to him; but the difficulty of transferring these to pottery-ware and covering them by a transparent silicious varnish seems to have baffled his most persevering endeavours. Scarcely able to provide for the maintenance of his wife and family, he had the greatest difficulty in procuring colours and pottery to effect his experiments. Half his time was lost in grinding and pounding materials, and the vain attempt to construct the necessary ovens: at length he contrived to interest the owner of a pottery, who undertook to bake for him his experimental pieces; but partly from ignorance, partly from ill-will, the attempt was inexpertly made; and, ruined in fortune, health, and spirits, at the close of twelve years of incessant labour, Palissy was compelled by the wants of his family to abandon his pursuit, and resume his more thriving calling as an engineer. Having obtained from the district a commission for the draining of certain salt-marshes, he executed his task with credit and profit. No sooner, however, had he obtained the means of continuing his attempts, than he returned with greater diligence than ever to his enamelling, and despatched the new samples of his skill to be baked in the furnace of a glasshouse.

And now, for the first time, the composition he had invented proved fusible. Out of *three hundred* specimens of various experiments submitted at the same time to the action of the furnace, a single one presented, on cooling, a hard, white, vitreous, brilliant surface; and the joy of poor Palissy in the discovery may be easily conceived.

"I was, however, at that time of my life so simple," says he, in his narrative of his experiments, "that the moment I had hit upon the real enamel, I set about making the pottery-ware to which it was to be applied; and, after losing eight months in the task, I had next to construct a furnace similar to those of the glasshouses, in which it was to be baked. No one can conceive the trouble it cost me, for I had to do all by the single labour of my hands—to sift the mortar, and even draw the water with which it was to be mixed. I had not so much as the help of a single man in fetching the bricks; my own back bore all!

"My first baking prospered pretty well. But when it came to the second, after the enamel had been spread over the pottery, I was unable to produce the heat necessary for the fusion. Six days and nights did I remain feeding and watching the furnace, half distracted, and almost stupefied by the intense heat and my own bitter disappointment. At last it occurred to me that the composition contained an insufficient proportion of the substance which had produced fusion in the former instance; and I accordingly set about grinding and pounding, though still obliged to keep up the fire of the oven, so that I had treble labour on my hands.

"The former pieces being now spoiled, I was forced to go out and purchase new pots to be covered by the fresh composition; and on my return, I had the misery of discovering that my stock of wood was exhausted! What was to be done? I rushed into my garden, and tore up the trellices; and these being insufficient, was obliged to sacrifice the dressers, stools, tables, and boarding of my house! All these were successively thrust into the furnace, in the hope of melting the enamel!"

The reader will probably recall to mind the account given by Benvenuto Cellini in his Memoirs, of having contributed all his pewter dishes and household utensils to the metal prepared for his noble statue of Perseus, which proved slow and difficult of fusion. But the Italian protégé of princes makes a vaunt of *his* sacrifice, whereas the meek Palissy couches his statement in the terms of a confession.

"Scorched by the heat of the furnace," says he, "and reduced to a skeleton by the transpiration arising from this prodigious heat, I had now a new vexation in store for me. My family having indiscreetly circulated the report of my taking up and burning the flooring of my house, I was considered insane by my neighbours, and my precarious credit totally destroyed. If I had then died, I should have left behind me the name of a madman who had ruined his family by a frantic speculation. But though sick and dispirited, I cheered myself with the certainty that the discovery of which I had been so long in pursuit was effected; and that henceforward I had only to persevere in my labours. The difficulty of maintaining my family for five or six months longer, till a satisfactory result could be obtained, was the first consideration; but in order to hasten the period, I hired a potter to assist me in my work, furnishing him with models and materials.

"A cruel drawback it was, that I was unable to maintain this man in my dismantled home; for I was forced to run up a bill for his board at a neighbouring tavern. Nay, when, at the end of six months, he had made me the various articles of crockery according to my designs, so that nothing remained to be done but to cover them with my enamel, and submit them to the furnace, being forced to dismiss my workman, I had no means of paying him his wages, except by giving him my clothes, which I accordingly did; and my person was now as thoroughly dismantled as my house!"

[To be continued.]



[Sir Hudibras addressing the Mob.]

HUDIBRAS.—No. IV.

The second canto, according to the argument prefixed, contains

> "The catalogue and character
> Of th' enemy's hon'rable war;
> Whom, in a bold harangue, the Knight
> Defies, and challenges to fight;
> Th' encounter Talgol, routs the Bear,
> And takes the Fiddler prisoner;
> Conveys him to enchanted castle,
> And shuts him up in wooden Bastile."

This is literally all the matter detailed in the eleven hundred and seventy-nine lines of the canto, and which are of the purest, the truest, and [illegible]. Butler's error, considered [illegible] was to selecting too trivial a subject as the medium [illegible] conveying his thoughts to the world. He not only did this, but he took a side; [illegible] party gave up what was merit for mankind."

[illegible] does have alike joined in punishing him this, by refusing, of [illegible], readership to one much [illegible] Johnson have said, "Of the character [illegible] the man of dangerous rebellion!" and censured for its [illegible] and misapplication as far from [illegible]; others have objected to it as vulgar ribaldry. The learned Dr. Zachary Grey, in the greatest twelve edition of Hudibras, says, "The reader, he hopes, will better apprehend and relish the satire couched in this poem when he is acquainted with the persons and tran[illegible] at which it is levelled." He adds that in all previous editions it had been generally supposed "that those renowned champions Crowdero, Orsin, Talgol, Mag[illegible]nago, Cerdon, Colon, and the brave heroine Trulla were only imaginary persons, from whence many have concluded these adventures to be romantic and fabulous, instead of true history," as he undertakes to prove them to be; and gives, on the authority of Sir Roger L'Estrange, "who, being personally acquainted with the poet, undoubtedly received the secret from him," what he considers the facts of this history.

This secret and these facts consist in telling us that Crowdero was one Jackson, a milliner in the Strand; that Orson was Joshua Gosling, the keeper of the bear at Paris Garden; that Talgol "was a butcher in Newgate Market, who afterwards obtained a captain's commission for his rebellious bravery at Naseby," &c. But what does this information furnish? A fiddler, a bear-ward and his bear, a butcher with his dog, a cutler, a travelling tinker with his doxy, and a cobbler, are, we may almost say, the necessary constituents of bear-baiting mobs, and what is there in the [illegible] racteristic of an individual? That the "[illegible] Newgate Market" make the speech commencing

> "Thou vermin wretched
> [illegible] as boiled pork was hateful
> [illegible] and of worship, that dost prize
> Thy rump of justice, as of capon

If not, the secret amounts to no more than that there was a "butcher in Newgate Market" who went to a bear-bait; and the same of the rest—a fact we can readily admit, and also that the author knew this important fact. But as to its increasing our relish of the satire, that we altogether deny. Indeed, with regard to the butcher, the speech is so little in unison with what had been previously stated, that Dr. Grey is compelled to suppose that "probably Talgol might then be a cavalier," "notwithstanding Sir Roger L'Estrange (his only authority) has asserted to the contrary."

We are extremely anxious, perhaps unnecessarily so, to clear the poem from the exaggerated importance attributed to its political tendency. That Butler was a hearty and even passionate royalist and churchman we may admit—too good a one, we have no doubt, to have acknowledged for a moment that by such characters as he has here exhibited the downfall of the hierarchy and monarchy had been effected, and the gallant cavaliers combated, and defeated. He believed in no such degrading impossibility, but he placed in the mouths, or on the shoulders, of low and ridiculous imaginary personages, the culled absurdities of doctrine, peculiarities of expression, and the culpable actions, of any of the parties or sects* opposed to his own, perhaps even some personal features of individuals, interspersing the whole with his own never-failing wit, and honest exposure of and scorn for mere pretence, wherever existing.

Bear-baiting was by no means a peculiarly puritanical amusement, but rather the contrary. It had been patronised by monarchs, and supported by the aristocracy. Mr. J. P. Collier, in his 'Memoirs of Edward Alleyn, the founder of Dulwich College,' informs us, that when he wished to, indeed when he did, retire from the stage, "he was compelled by virtue of his office of Master of the Games," which he held from the king, "to superintend the affairs of the Bear Garden." By the patent of his office "he was authorised 'to take up' any bears, bulls, or dogs, in any part of the kingdom, for the service of his majesty, on payment of what might be considered a reasonable price." This power was deputed, and Mr. Collier has given a curious case of dispute arising from the attempt to take a gentleman's dog in Cheshire, but who charged the deputy dog-providers "for his majesty's service" with theft, and the justices only refrained from committing them by their "seeing the great seal of England, and their deputations." But these rude sports had a stronger hold upon the popular feelings than the *vanities*, as they were called, of dress, or dancing, or music, or church rituals. Many a one could subdue his respect for plum-porridge who could not refrain from enjoying a bout at single-stick, or attending a bear or bull-bait, or partaking in a game of cricket. Of course, such persons were not religious leaders, but they were often hearty followers. Notwithstanding what Dr. Grey has said of the characters of the heroes on this occasion, we think an unprejudiced person will discover but few puritanical features in their description, with the exception of Cerdon the cobbler, who is said to be a preacher, and of course as such must have been a dissenter. The characters indeed are merely sketches—it is the illustrations that gem the frame-work in such rich profusion that constitute the real attraction of the poem.

The Knight and Squire are represented as proceeding

> "Until they reach'd the fatal champain
> The dire Pharsalian plain, where battle
> Was to be wag'd 'twixt puissant cattle,
> And fierce auxiliary men
> That came to aid their brethren:
> Which th' enemy did then encamp on;
> Who now began to take the field,
> As Knight from ridge of steed beheld,
> For as our modern wits beheld
> Mounted a pick-back on the old,
> Much further off, much further he
> Raised on his aged beast could see."

This last allusion is to the question then warmly contested as to the superiority of ancient or modern learning, in which Boyle, Temple, Swift, and many others took an active part.

> "I' th' head of all this warlike rabble,
> Crowdero marched, expert and able.
> Instead of trumpet and of drum,
> That makes the warrior's stomach come,
> Whose noise whets valour sharp, like beer
> By thunder turn'd to vinegar;
> (For if a trumpet sound, or drum beat,
> Who has not a mouth's mind to combat?)
> A squeaking engine he applied,
> Unto his neck on north-east side,
> Just where the hangman does dispose,
> To special friends, the knot of noose;
> For 'tis great grace when statesmen straight
> Dispatch a friend, let others wait."

With the addition that

> "His grisly beard was long and thick,
> With which he strung his fiddlestick;"

and that at a bull-baiting in Staffordshire

> "his leg, then broke,
> Had got a deputy of oak,"

we have the whole of the materials found sufficient for identifying Crowdero with Jackson the milliner in the Strand, who lost his leg in the service of the Roundheads and then became a fiddler. The succeeding figure is the "marshal to the champion Bear:"

> "This leader was of knowledge great,
> Either for charge, or for retreat.
> He knew when to fall on pell-mell,
> To fall back and retreat as well.
> So lawyers, lest the bear defendant,
> And plaintiff dog, should make an end on't,
> Do stave and tail with writs of error,
> Reverse of judgment, and demurrer,
> To let them breathe awhile, and then
> Cry whoop, and set them on again.
> As Romulus a wolf did rear,
> So he was dry-nursed by a bear,
> That fed him with the purchased prey
> Of many a fierce and bloody fray;
> Bred up, where discipline most rare is,
> In military Garden Paris.
> For soldiers heretofore did grow
> In gardens, just as weeds do now;
> Until some splay-foot politicians
> T' Apollo offer'd up petitions,
> For licensing a new invention
> Th'ad found out of an antique engine,
> To root out all the weeds that grow
> In public gardens at a blow,
> And leave th' herbs standing. Quoth Sir Sun,
> My friends, that is not to be done.
> Not done? quo' statesmen; yes an't please ye,
> When 'tis once known, you 'll say 'tis easy.
> Why then let 's know it, quoth Apollo:
> We 'll beat a drum, and they 'll all follow.
> A drum! (quoth Phœbus) troth that 's true,
> A pretty invention quaint and new.
> But tho' of voice and instrument
> We are th' undoubted president;
> We such loud music don't profess,
> The Devil 's master of that office,
> Where it must pass, if 't be a drum,
> He 'll sign it with Cler. Parl. Dom. Com.

* inve... mens o... time to the ... few lines of the end of page 61, this word has sented, on cool-ed into *sort*; the passage should read—"the su... face; and the ...ther than an individual." ... may be easily conceive...

To him apply yourselves, and he
Will soon dispatch you for his fee.
They did so, but it prov'd so ill,
Th'ad better let 'em grow there still.
But to resume what we discoursing
Were on before, that is, stout Orsin:
That which so oft by sundry writers
Has been apply'd t' almost all fighters,
More justly may b' ascrib'd to this,
Than any other warrior (viz.)
None ever acted both parts bolder,
Both of a chieftain and a soldier.
He was of great descent and high,
For splendour and antiquity,
And from celestial origine
Deriv'd himself in a right line.
Not as the ancient heroes did,
Who, that their base births might be hid,
(Knowing they were of doubtful gender,
And that they came in at a windore)
Made Jupiter himself and others
O' th' gods, gallants to their own mothers,
To get on them a race of champions,
(Of which old Homer first made lampoons)
Arctophylax in northern sphere
Was his undoubted ancestor;
From him his great forefathers came,
And in all ages bore his name:
Learned he was in med'c'nal lore,
For by his side a pouch he wore,
Replete with strange hermetic powder,
That wounds nine miles point blank would solder,
By skilful chymist with great cost
Extracted from a rotten post."

But we must reserve the remainder of the characters for another opportunity.

PALISSY.

[Concluded from page 132.]

All the rest of his labours, poor Palissy had to encounter alone; though his hands were so cut and bruised with his work, that he was obliged, he says, to eat his pottage as well as he could with his hands wrapped in linen rags. The handmill in which he ground his materials required the power of two strong men to work it, yet he was wholly without assistance. Nor were his disappointments yet at an end. After having, with infinite pains and considerable cost, constructed a new oven, it turned out that the mortar he had used was full of flints,—probably the refuse of his materials; and when the furnace was heated, these flints flew, and attached themselves to his pottery, so that it was completely spoiled.

"On passing the hand over my vases," says he, "little fragments of flint were perceptible, which cut like a razor. I instantly determined to break them up, rather than sell them in a deteriorated state for what they would fetch, which might have injured the reputation of my discovery. But no sooner had I done so, than I was beset by the maledictions of my starving family and the mockery of my neighbours, who treated me as a madman for not having realized a few crowns by my damaged goods."

Nevertheless the man of genius toiled resolutely on!—Satisfied of the strength that was in him, and of the importance of his discovery, he went to work again, with an injured credit and constitution, an object of hatred to some and contempt to others. From the exhausting nature of his labours, his arms and legs had become like sticks; so that, according to his own brief description, there was nothing to keep up his garters, and his stockings came upon his heels as he walked, till he was the picture of wretchedness and destitution. Between the action of the prodigious heat of his furnace, and the influence of the rain and frost on his ill-constructed works, the place was frequently unroofed, compelling him to borrow the materials for its reparation. But this was not always to be accomplished; and he tells us that he often remained watching his oven through the winter nights, exposed to wind and weather, with the owls hooting on one side and the dogs howling on the other.

"Wet to the skin with the beating in of the heavy rains, and groping about in the dark for want of a candle, I have often retired to rest at midnight, or even at day-break," says he, "looking like some drunken wretch who had been rolling in a gutter. But the worst I had to suffer was from the accusations of my neighbours, who had assisted me, and who now regarded me as a robber; and the reproaches of my family, who treated me as a selfish lunatic."

This is but a faint outline of the miseries and fatigues sustained by poor Bernard Palissy, in bringing to perfection an art which has proved so highly beneficial to his own and other countries. The furnaces and ovens of his invention are still in use at Sèvres, and have been closely copied in our own and other porcelain-works. The moulds in which the vases are baked to secure them from accident, were devised by Palissy after his unlucky loss from the flying of the flints; and his recipes for the mixing of colours are still patent.

The porcelain of Palissy soon attained a prodigious reputation, and few museums or collections of objects of *virtù* in our own time but contain specimens of his works, under the name of Raphael ware, or china of the middle ages. The embossed dishes exhibiting reptiles and animals, in great perfection, were the invention of Palissy; and several of his dishes and vases present copies after celebrated pictures, executed in relief. Table services, to replace the wooden and pewter vessels then in use, were the chief objects to which he devoted his art; and with so much taste and skill, that many of the original designs exhibit the genius of a first-rate sculptor.

The fame of his discovery extended rapidly through France, and orders were given him by all the nobles of the court of Henri II.: among others, by the Duc de Montmorency, who employed him to decorate his stately château of Ecouin. One of the chambers was paved with tiles of Palissy's porcelain; which still remain perfect, unless where the design has been destroyed by the introduction of one of those huge ungraceful N's which, during the empire, were made to disfigure all the ancient public edifices of France.

It was while he was occupied in working for the Connétable de Montmorency, that the artist was fated to undergo a new species of persecution. Being a strict Huguenot, his manufactory was denounced by the Commission despatched into Saintonge, under the command of the Duc de la Rochefoucauld; and the Catholics of Saintes caused him to be arrested and sent to Bordeaux, to be burnt at the stake. But the reputation of Palissy was now so deservedly great, that having presented a memorial to the queen-mother, Catherine de Medicis, he was rescued by her intervention from this terrible sentence. It was probably in gratitude for her interference that he invented the miniature statues, or *figulines*, of the king and queen-mother, to which he frequently recurs—a name derived from *figulus*, or working in clay.

Thus driven from his native place, Palissy established himself in Paris, where he commenced the first collection of natural history ever attempted in France, and a series of experiments in chemistry and metallurgy of the highest importance. George Agricola, who passes among the French for the father

of the latter science, was just then publishing his treatises on mineralogy. But he wrote in Latin, of which Palissy did not understand a word; and it was the laborious experimentalist who was the first to communicate to his countrymen at large the mysteries of the bowels of the earth. The first course of public lectures ever given in Paris was by Palissy, who placarded the walls of the city with an intimation that for the price of one crown he was ready to communicate to all who were desirous of information the whole of his discoveries in physics and natural history, and to argue with those who were prepared for refutation. Such as were not satisfied with his instructions were to receive back their crown on demand. Palissy has informed us that the return of the crown was not in a single instance demanded; and he has also furnished us with a list of his audience, which appears to have comprised the leading nobles, prelates, and magistrates of the time. In order to appreciate the merit of his undertaking, be it remembered that at that period a royal astrologer monopolised the scientific patronage of the court; and that alchemy was cultivated, not alone by the ignorant, but the learned of the times. The city was moreover distracted by civil wars, and the bold lecturer who, without understanding a syllable of the learned languages, had thus thrown down the gauntlet to all the philosophers of the age, belonged to the persecuted party. Nevertheless he continued to assemble around him the most remarkable personages among the learned of his day, and the simple-hearted but enthusiastic old potter, after wasting his best days over his miserable furnace, had the glory of enlightening the minds of the most enlightened.

In that original course of lectures, the branch of science to which Cuvier has added in our own time such remarkable illustration was first called into existence. Palissy was the first to assert that the fossil shells and plants hitherto esteemed a sport of nature, were the identical objects in a state of transformation. The modern theory of the earth was shadowed forth in his assertions concerning the nature and origin of fossil fishes, which for more than a century afterwards were suffered to lie dormant. By this wondrous instinct of an uninstructed mind, the memory of Palissy became exposed to the sneers of the more learned but far more ignorant Voltaire, who speaks of him as "a visionary." "Palissy and his shells" afforded a fertile theme for the pleasantries of one to whom a jest was more available than a fact.

Poor Palissy had now tasted as largely of the sweets of fame and prosperity as was compatible with the evil spirit of the hour. While still collecting around him a host of eager disciples, he was seized and flung into prison. But for the intervention of the Duc de Mayenne, immediate execution would have followed his arrest; and the venerable professor, who was now eighty-eight years of age, was incarcerated in the Bastille, to secure him from an ignominious death.

Some months afterward he was visited in prison by Henri III., who was making a round of inspection in his heretic-coop. "*Mon bonhomme*," said his majesty, "unless you can manage to conform in matters of religion, I am under the necessity of giving you up to your enemies."

"Sire," replied the poor old man, "I am content to [illegible] the remnant of my days to the glory of God. [illegible]orry to hear so great a king pronounce that he [illegible]r the necessity of acting against his conscience, a[illegible]at particular am greater than my sovereign [illegible] whom he is constrained; for I have no fear of de[illegible]am consequently independent."

A few days afterward, Bernard Palissy expired in the Bastille, in the fulness of his years and virtues, about the year 1588.

The works he has left us are of high and varied interest, comprising treatises on medicine, agriculture, hydraulics, fortification, in addition to those on metallurgy and chemistry. The history of the Reformed church in his native province, for which we are indebted to his pen, is equal to the works of the best historians of his age. But, above all, the shrewdness of his observations, penetrating his simplicity of manners and language, has afforded an invaluable addition to the moral history of these troubled times.

Such was Bernard Palissy, who, in addition to the creation of an important mechanical art, called into existence the germs of our most valuable scientific theories and institutions,—the first china-maker in France—the first public lecturer—the first originator of a collection of natural history—the first to assert the nature of fossil remains, and to create a school of mines and forests. In England he is chiefly noted as the first writer upon springs and fountains. But his memory is entitled to higher reverence, as that of a zealous and persevering man of genius, who overcame by energy of mind the united evils of persecution, poverty, and ignorance.

Distribution of Capital.—Capitalists do not easily enter a trade or withdraw from it. In a country so exquisitely organized as England, it is true that capital moves with velocity, where the capitalist cannot move; and of this we have a luminous explanation in Ricardo. Ricardo, who, as a stockbroker, stood in the very centre of the vast money-machinery accumulated in London, had peculiar advantages for observing and investigating the play of this machinery. If our human vision were fitted for detecting agencies so impalpable, and if a station of view could be had, we might sometimes behold vast arches of electric matter continually passing and re-passing between either pole and the equatorial regions. Accordingly, as the equilibrium were disturbed suddenly or redressed, would be the phenomena of tropical hurricanes or of auroral lights. Somewhat in the same silent arches of continual transition, ebbing and flowing like tides, do the re-agencies of the capital accumulated in London modify, without sound or echo, much commerce in all parts of the kingdom. Faithful to the monetary symptoms, and the fluctuations, this way or that, eternally perceptible in the condition of every trade, the great moneyed capitalist, standing at the centre of this enormous web, throws over his arch of capital, or withdraws it, with the precision of a fireman directing columns of water from an engine upon the remotest quarter of a conflagration. It is not, as Ricardo almost professionally explains to us, by looking out for new men qualified to enter an aspiring trade, or by withdrawing some of the old men from a decaying trade, that the equilibrium is recovered. Such operations are difficult, dilatory, often personally ruinous, and disproportionately noisy to the public ear in the process of execution. But the true operation goes on as silently as the growth of light. The moneyed man stands equidistantly related to many different staple interests—the silk trade, the cotton trade, iron trade, the timber and grain trade. Rarely does he act upon any one of them by direct interpolation of new firms, or direct withdrawals of old ones. An effect of this kind is generally as much beyond his power as beyond his interest. Not a man has been shifted from his station; possibly not a man has been intruded; yet power and virtue have been thrown into vast laboratories of trade, like shells into a city. But all has been accomplished in the night by the inaudible agency of the Post-office, co-operating with the equally inaudible agencies of capital, moving through banks and through national debts, funded or unfunded. Such is the perfection of our civilization. By the simple pressure of a finger upon the centre of so vast an organization, a breath of life is hurried along the tubes—a pulse is enlivened or depressed—a circulation is precipitated or checked, without those ponderous processes of change indispensable on the Continent, and which so injuriously disturb the smooth working of general business.—*De Quincey's Political Economy.*



[Conway Castle.]

CONWAY CASTLE.

Ashen the ancient Britons had been forced to retreat from the plains of England, and to shelter and defend themselves among the mountains of Wales, they maintained for several centuries a fierce struggle for independence against their Saxon and Norman oppressors. Many battles were fought on the border territories: sometimes they were driven back into their fastnesses, and compelled to admit the superiority, if not the supremacy, of the invaders, and to pay the tribute exacted from them; but no sooner was the pressure which kept them down relaxed or removed, than the fiery Welshmen were again in arms, and, rushing down upon the fruitful vales of the land which had belonged to their ancestors, they plundered the plunderers, devastating with sword and fire the homes of those who had so often made their own desolate. There had generally been a king of Wales, to whom the different chiefs were at least nominally subject, but in the tenth century the whole country was divided into the two principalities of North Wales and South Wales, both of which were compelled to acknowledge the feudal supremacy of Athelstan as king of England, and to pay an annual tribute. This tribute was reluctantly paid to the succeeding Saxon kings. On the accession of William the Conqueror the Welsh refused payment; he therefore invaded the country with a large army, and reduced them to obedience; but under William Rufus they were again in rebellion. In this uncertain state they continued, always oppressed but never effectually subdued, till the reign of Edward I. They had been slowly losing territory, especially in South Wales, by encroachments of the English barons, who, to defend their acquisitions, erected strong castles so near to each other as to form a chain of communicating fortresses, which extended from Chepstow to Milford Haven. The people of Wales still retained their simple and hospitable manners, and in times of peace they were gentle and courteous; their ancient laws and usages were yet unaltered; the bards continued to stimulate their martial spirit, and the conflicts with the English and the disputes and skirmishes among the Welsh chiefs themselves kept them in the continual practice of warfare. The conquest of the country was therefore no easy task, but required for its accomplishment such a king as Edward I., who was not only skilled in war, but one of the most resolute, persevering, cool, and politic kings that ever sat on the throne of England, and who, in the conquest of Wales, used all the "appliances and means to boot" of disunion fomented among the native chiefs, and of bribery to induce them to fight against their countrymen.

At the time when Edward I. determined on the conquest of Wales, Llewellyn was Prince of North Wales and Rees ap Meredith was Prince of South Wales. Llewellyn had formerly been in alliance with De Montfort, and had fought against Edward himself at the battle of Evesham, in which De Montfort was slain. Several years had passed away, during which Edward had been to the Holy Land, had succeeded his father Henry III. as King of England, had returned to his native country, and had summoned Llewellyn to appear at his court, to pay the feudal homage due to him as King of England. Meantime Llewellyn had entered into a contract of marriage with Elinor, the daughter of his unfortunate friend De Montfort. On her passage from France to Wales she had been intercepted and delivered to Edward, who held her a prisoner. Llewellyn was indignant at this treatment, and objected to appear at the court of Edward unless his affianced bride was set at liberty, and a safe-conduct was granted to himself, which Edward refused, and a war was the consequence. The Prince of South Wales and Llewellyn's own brother David joined the standard of the King of England with all their vassals. Edward advanced with a large army to Chester, crossed the Dee, took the fortresses of Rhuddlan and Flint, which he garrisoned, and, keeping a fleet on the coast to intercept all supplies for Llewellyn, patiently waited the

result of this blockade of North Wales. The result was such as Edward had anticipated. In November, 1277, Llewellyn, reduced to the extremity of destitution, was compelled to yield, and to submit to the hard terms which Edward imposed upon him—the forfeiture of nearly the whole of his territory and the imposition of a fine of 50,000*l*. This fine being much larger than so poor a country could pay, was of necessity remitted. Edward no doubt expected that all was now settled; but it was not so. David, seeing the result of the war, and that the territory to which he himself might have succeeded was wrested from his race, joined his brother Llewellyn, and North Wales was again in arms. On the night of Palm Sunday, 1282, David surprised and took the castle of Hawarden. A general insurrection ensued. The Welshmen rushed from their hills, and in many places drove the English beyond the marches, while David and Llewellyn laid siege to the castles of Flint and Rhuddlan. Edward, by means of a forced loan, soon collected a large army, and again crossed the Dee. While David opposed Edward in North Wales, Llewellyn advanced to meet his enemies in South Wales, but he was slain in an engagement with the Earl of Mortimer, near Builth, in Brecoushire, December 11, 1282. David, who now succeeded his brother as Prince of North Wales, kept up for a short time the unequal contest with Edward, whom he more than once defeated. Edward, as before, not only intercepted all supplies, but hired Basque mercenaries trained to mountain warfare, who tracked like bloodhounds the half-starved and ill-armed Welshmen to their last retreats. David at last was taken prisoner, and was barbarously put to death at Shrewsbury, by hanging, drawing, and quartering. The war was now at an end, and the slaughter of the Bards followed soon afterwards.

Edward now saw the necessity of securing his conquest. For this purpose he built the two strong castles of Caernarvon and Conway. Caernarvon Castle is described in the 'Penny Magazine,' No. 138, p. 207 (1834), and a general view of Conway has been given in No. 406, in the 'Tour in Wales,' No. 3.

Conway Castle was completed in 1284, and from the peculiar style and excellence of the architecture, was doubtless constructed by Henry Ellerton, or De Elreton, who built Caernarvon Castle. Conway Castle, when in its perfect state, must have been, as well from situation as from strength and beauty of structure, one of the most magnificent fortresses of Britain. The situation is precisely the lofty cliff on which Gray places his bard:—

> "On a rock whose haughty brow
> Frowns o'er old Conway's foaming flood."

The form of the castle was oblong, and extended along the verge of the precipitous rock, the base of which is washed by the river Conway, which winds round two of its sides so as to make it almost a peninsula. The inner wall of the castle fronted the town of Conway. Between the town and the castle there was a wide and deep ditch, which was crossed by a drawbridge to the principal entrance. A small entrance, defended by a strong advanced work, communicated with the river by narrow winding stairs cut in the rock. This is no doubt the postern entrance shown in the drawing at the head of this article. The walls of the castle were of great thickness, and were flanked by eight vast circular embattled towers, each of which had a slender machicolated watch-tower rising from the top, which produced an effect of great lightness and elegance. The two towers which flanked the grand entrance were called the King's Tower and the Queen's Tower, in each of which was a beautiful oriel window. The interior of the castle was divided into two courts. The apartments which they comprised can scarcely now be traced. The great hall curved conformably to the bend of the outer wall. It was 130 feet long, 30 feet wide, and 20 feet high. It had six narrow windows through the thick wall on the river side; three larger windows opened into the interior court, and there was another window still larger at one end; at the other end was the great fire-place, and there was a smaller fire-place at the side. The roof was supported by eight arches. Beneath were extensive vaults for ammunition and provisions. Edward I. and Queen Eleanor spent a Christmas here; and knights and ladies were revelling in this great hall while the conquered Welshmen were writhing beneath the sense of degradation as well as the oppressions and exactions to which they were forced to submit.

Conway town is of a triangular form, and stands on a steep slope towards the river. The lower side of the triangle extends from the castle along the bank of the river, where there is now a long quay, with a fine view upwards and downwards. The town was surrounded by a high wall twelve feet thick, strengthened by twenty-four circular and semicircular towers. It had four principal gateways; and, to prevent approach from the sea, a curtain, terminated with a round tower, ran out into the river from each end of the wall. At low water the river is less than fifty yards wide, and only about eight feet deep, and encumbered with shoals. At high water the width is about a mile. The harbour is dry at low water, and frequented only by a few coasting vessels. The population of the parish of Conway, in 1841, was 1358.

At the commencement of the civil war in the reign of Charles I., Conway Castle was held for the king by Dr. John Williams, Archbishop of York, who appointed his nephew William Hookes governor in 1643. In May, 1645, Prince Rupert superseded Dr. Williams in the command of North Wales, which, in its result, proved to be a change of ill policy. Williams seems to have had the spirit of one of the old warrior bishops. Disgusted and incensed, he applied to the parliament for a promise of forgiveness for his former opposition, which he easily obtained, and then joined Mytton in the reduction of Conway. The town was taken by storm, August 15, 1646. Bishop Williams was among the combatants, and was wounded in the neck. The castle surrendered, November 10, 1646. The castle was not dismantled by the parliament; but a grant of it had been made in the reign of Charles I. to the Earl of Conway and Kulalta, who, when he obtained possession in the reign of Charles II., directed his agent to remove the timber, iron, lead, and other materials of value, and to transport them to Ireland under pretence of the king's service, but in reality for the repairs of his own property. The royal commissioners for North Wales made a remonstrance against these proceedings in 1665, but it seems to have been without effect.

The castle is now very ruinous, but extremely picturesque. The view up and down the river is delightful.

THE MATERIALS EMPLOYED AS MONEY.

THE ideas prevalent concerning money are often grounded on a vague conjecture that there is some intrinsic property in gold, silver, and copper, whereby those metals alone are fitted to be made into current coin. It is, however, chiefly from the mechanical properties of those metals, and from the comparative scarcity of the first two, that the selection has been made; and we shall find that various other materials have occasionally been employed.

In the earlier stages of society, the exchange of produce and goods was doubtless made by barter, each

person giving a commodity which he did not want for another which he desired to obtain. But it could not always be easy so to apportion the two commodities as to determine whether the one was an exact equivalent to the other. Hence arose the custom of employing a third article that should serve as a standard to which the other two might be compared. In accordance with the truth in mathematics, that "two quantities which are each equal to a third quantity are equal to each other," this third quantity in commerce, viz. money, is the means whereby the equality or equal value of the other two is determined. The third commodity was at first *cattle*, and there are many allusions in the early writers to commodities being valued at so many oxen. But as an ox is not only so bulky as to be transferred from one possessor to another with difficulty, but is also of too great value to be used as an equivalent for small purchases, the utility of adopting some less valuable and more divisible standard or money became apparent, and we accordingly find many substances to have been so employed, and to be so employed indeed in our own times.

Shells are at the present day current for money in many parts of the East. These shells are brought from the Maldive Islands, and are current in India under the name of *cowries*, while in Africa they obtain the name of *bouges*. In the kingdom of Congo there is said to be another kind of shell current, called *zimbi*. Two thousand of these zimbi form a *maconti* or *macute*; and one of the writers on Central Africa some years ago stated that two Flemish knives were deemed worth a maconti; a copper basin, two pounds in weight and twelve inches in diameter, three maconti; 2 fusee, ten maconti, &c. The cowries of India circulate at the rate of about sixty-five for a copper coin nearly equivalent to a halfpenny.

Fruits have in some countries been used as money. In the last century, for matters are probably changed by this time, the *cacao* and the *maize* were current among the Mexicans as money: the former estimated so that fifteen should be equal to a Spanish rial. *Almonds* were used in some parts of India where cowries were not current. In proportion as the year's crop was good or bad, this kind of money fluctuated in value; but in average years about forty almonds were equivalent to a halfpenny sterling.

Those nations who subsist chiefly by the chace, such as the American Indians, are accustomed to use *peltry*, or skins, as money. The same material converted into leather has been occasionally employed. There is a comedy in which an allusion seems to point to the use of *leather* money in England before the Conquest: the wealth possessed by a lady has been buried with her, and one of the characters says—

> "Why this was such a flirk of piety
> I ne'er heard of: bury her gold with her!
> 'Tis strange her old shoes were not intarr'd too,
> For fear the days of Edgar should return,
> When they coined leather."

In a History of Allchester, printed in 1667, there is an allusion to money made of leather, in the following words:—"King Edward I. his leathern money, bearing his name, stamp, and picture, which he used in the building of Carnarvon, Beaumarish, and Conway castles, to spare better bullion, were, since I can remember, preserved and kept in one of the towers of Carnarvon Castle." Mr. Ruding, in referring to this passage, says that nothing further is known of these leather coins than what is here stated.

Sir John Mandeville, an early traveller, who does not bear a very high character for veracity, speaks of *leather* and *paper* money as having been in use in Tartary. As the subject was not exactly one of those which he was most likely to exaggerate, and has nothing improbable in itself, we will quote his account of the matter:—"This Emperour [the Khan of Tartary] may dispensen as moche as he will, withouten estymacioun. For he despendethe not, ne makethe no money, but of lether emprented, or of papyre. And of that money, is som of gretter prys, and somme of lasse prys, aftre the dyversitee of his statutes. And whan that money hathe ronne so longe that it begynnethe to waste, than men berin it to the emperours tresorye; and than thei taken newe money for the olde. And that money gothe thorghe out alle the countree, and thorghe out all his provynces: For there and bezonde hem, thei make no money nouther of gold nor of silver. And therefore he may despende ynow and outrageously." Whether the khan could really spend "ynow and outrageously," even if his money were made of leather, involves a question in political economy which Mandeville was perhaps not quite able to solve.

Salt is used for money in some countries; it is cut into square or brick-shaped pieces, and passes from hand to hand as money. In remote ages *corn* was employed for the same purpose in agricultural counties; and even at the present day rents and agricultural wages are in some places estimated by a certain quantity of corn, which in this case serves the place of money. In Iceland and Newfoundland, where fishing forms an important part of the occupations of the inhabitants, *dried fish* performs the functions of money. In some of the West India Islands *sugar* has occasionally been used for the same purpose; and Adam Smith states that, at the time he wrote his 'Wealth of Nations,' there was a village in Scotland where it was customary for a workman to carry *nails*, as money, to the baker's shop or the alehouse.

But all such media of exchange are manifestly defective. They are perishable, or bulky, or liable to change considerably in value, or limited to the extent of district through which they circulate, or are deficient in some one or more of the qualities which money ought to possess. Metal of some kind or other seems to possess a greater number of qualities favourable for this purpose than any other substance; and we accordingly find that metal has been by far the most extensively used in all civilised countries.

Most of the common metals have been employed for this purpose, in greater or less degree, and in some country or other. Some of these we may mention in succession.

Brass.—In the reign of Henry VI. the master of the king's mint in Ireland was authorized by indenture to coin certain money; among which were brass coins to be of the value of one silver penny each, and to have a certain device; and others of a like weight and material to have a different device. Again, in Henry VIII.'s reign, the king, as is stated by Sir John Ware in his 'Annals,' "to maintain his charges in Ireland, being now hard put to it for lack of monies, by reason of the vast treasure wasted in his expedition into France and Scotland, and compelled by necessity, gave directions to coin brass money, and commanded it by proclamation to pass for current and lawful money in all parts of Ireland." In the time of James II., among the extraordinary shifts to which he was put in maintaining his position in Ireland, the king sent an order to the master-general of the ordnance, commanding him to deliver up two brass cannon to the master of the mint, for the purpose of having them melted and coined into money; and the following letter was also sent to the various collectors of the revenue in Ireland:—"We have great occasion for his Majesty's use to procure so much hammered or forged copper and brass as your parts can afford, and judging by the decay of trade and desolation of the country,

that there may be a great deal in your district or part, we desire you, by yourself and officers, to inform us presently what quantity you may be able to furnish us with, and what the current prices are of each. And wherever you can get, buy at the best rate you can, and as soon as you have four or five hundredweight, pray send it to the Commissioners of his Majesty's Mint." In a pamphlet published soon afterwards, the writer, in allusion to the above orders to *buy* these metals, says—"It seems that they not only bought, but pillaged even the citizens' kitchens, &c., because they found it difficult to get a sufficient supply of copper or brass for the Mint."

Tin.—This metal was coined into money by Charles II., in 1684; and his successor, who signalized himself by his brass money, issued some coins made of *gun-metal* and of *pewter*, each of which contains tin. But with respect to the tin farthings of Charles II., it was soon found that the king was likely to have the farthings sent to him in payment of taxes; and as this did not suit his purpose, the project was given up. *Iron* was used for money by some of the early nations. *Lead* was used for small coins in England in the reign of Henry VIII. The leaden money afterwards circulated seems to have been merely the tokens or substitutes for money mentioned in a former article (p. 110).

Endeavours have been made in modern times (and successfully as respects Russia) to use *platinum* as a material for money. With respect to *paper*-money, this is not so much actual money, as a representative or symbol of it: since the honour or good credit of those who issue it is the only thing which gives value to the paper—it having no intrinsic value in itself beyond the fraction of a farthing, which the piece of paper, as such, is worth.

But copper, silver, and gold have been the metals most employed for this purpose: the two latter as the proper and most fitting, and the former for the convenience of making very small payments. The solidity, divisibility, and durability of silver and gold, together with the limited supply and the pretty equable maintenance of value, are the chief qualities which recommend these metals for coinage.

In modern times the government has not to go about in search of gold and silver for conversion into money. There are bullion-dealers who buy ingots of gold and silver from abroad, or buy up foreign coins or old English coins, or fragments of gold which the refiner has procured from many sources and melted down into a mass; and the gold thus procured, if taken to the Mint under certain regulations and at certain appointed times, may be there coined into money, small deductions being made to pay the expense of coining.

But in former times the government were often sadly at fault as to the means of obtaining the precious metals for conversion into money. At one time it was ordered that no gold or silver should be taken out of the country; at another, that none should be used for plate, or gold lace, or unnecessary luxuries; at other times certain advantages were offered to the possessors of gold and silver, to induce them to have it coined.

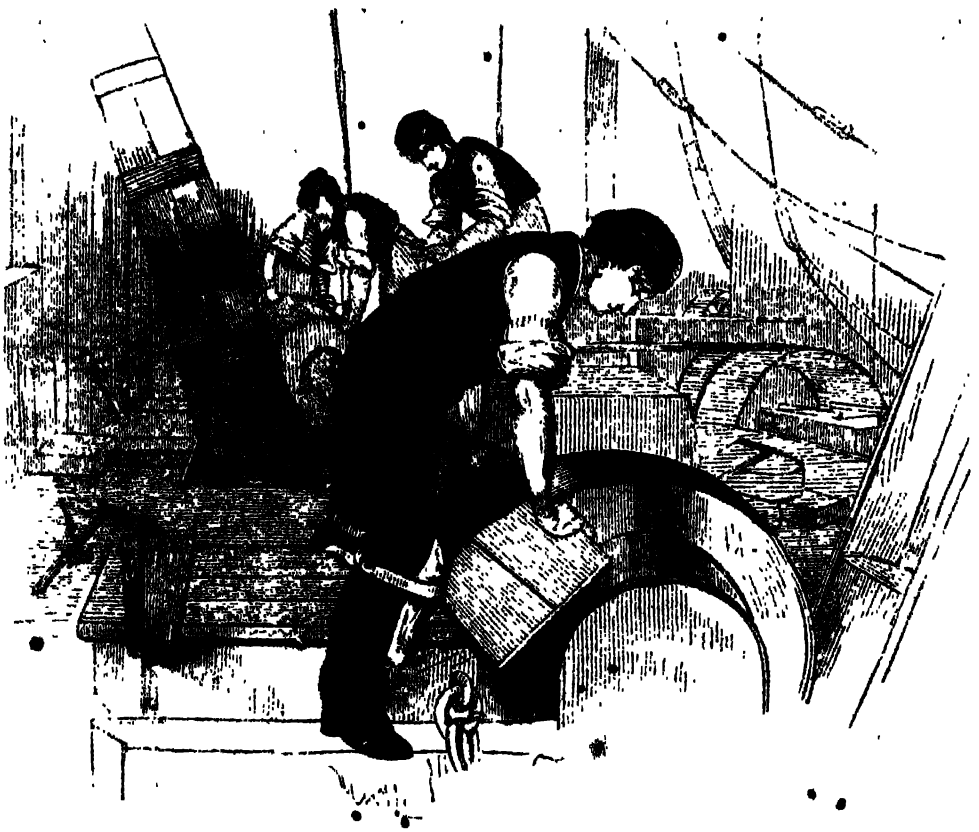
We need hardly wonder if, when coin was scarce and the means for making it were also scarce, and when ignorance in matters of science greatly prevailed, there were attempts made, or at least hopes held out, to transmute the baser metals into gold by the mysteries of alchemy. We accordingly find such instances to have occurred. Edward III. after trying in vain to get a sufficient supply of bullion, is said to have looked to the skill of Raymond Lully, the alchemist, for a stone. Ashmole has given a very circumstantial account of the bringing of Lully into England by Cremer, Abbot of Westminster; of his agreeing to make the king rich by his art, in consequence of that monarch's promise to enter into a war against the Turks; of his refusal to work any longer when he found that Edward would not keep that promise; and of his being shut up in the Tower in consequence. That Edward believed in the powers of alchemy for this purpose is proved by one of the Patent Rolls, which states that the king had been given to understand that John le Rous and William de Dalby could make silver by "art of alkemony;" that they had heretofore made it, and still did make it; and that by such making of that metal they could greatly profit the realm; he therefore commanded Thomas Carey to find them out, and to bring them before the king, with all the instruments and apparatus belonging to the said art: if they would come willingly, they were to be brought safely and honourably; but if not, they were to be seized, and brought before the king, wherever he might be.

Henry IV. seems to have believed in this art, and to have prohibited its exercise, probably from a fear lest the coinage should be tampered with. Henry VI. granted licences to different individuals, permitting them to follow the art and mystery of turning the baser metals into gold for coin. In the thirty-fifth year of his reign, however, after having been promised by these professors wealth sufficient to pay all his debts in gold and silver, and being foiled in his expectation, he issued a commission of inquiry into this art, the means by which it was carried on, and the probable grounds for success. The constitution of this commission was sufficiently strange; for it consisted of two or three friars, the queen's physician, a schoolmaster, an alderman of London, a fishmonger, two grocers, and two mercers. What the result of this commission was, Mr. Ruding says he has not found any documents to show; but another licence to pursue their art was granted to alchemists in a later year of the same king's reign. In the seventeenth of Edward IV., a letter was received by the Mayor of Coventry from the king, which shows that the hope of procuring gold cheaply, whether for coinage or for other purposes, by the aid of the mystic art, was still entertained in high quarters. It runs thus:—"Trusty and well-beloved, we grete you well, and late you wite that it hath been shewed unto us that oure wele-beloved John Frensh, oure s'v'nt, con'inying and com'only abydyng in oure cite ther, entendeth be his labr to practise a true and p'fitable conclusion in the cunning of transmutac'on of metalls, to oure pr'fyte and pleasure, and for to make a cler shewing of the same before certa oure s'v'nts and counsells by us therefor appointed, is required a certayn tyme to p'par his mat'ials; we not willing therfor oure seid s'v'nt to be trobled in that he shall so work or p'pare for oure pleasure and p'fite, woll and charge yewe that ye ne suffer hym in eny wyse by eny p'sone or p'sones to be letted, troubled, or vexed of his seid labour and practise, to thentent that he at his goode lib'te may shewe unto us, and such as be by us therfore appointed, the cler effect of his seid conclusion."

Henry VIII., too, shared in the same delusion; for there is among the Patent Rolls one showing that he had recourse to alchemy for the supply of his mint with bullion; he gave a patent to certain parties for practising that art, and speaks with the utmost confidence of being able soon to pay all his debts with real gold and silver produced by the *stone*—by which we are probably to understand the "philosophers' stone" of the alchemists.

When it is known that such a man as Bacon believed in the possibility of transmuting other metals into gold, we need not wonder that in an earlier age, and among men of less powerful mind, the same credulity prevailed.

A DAY AT THE SHEFFIELD CUTLERY-WORKS.



[Saw-Grinders.—Sheffield Grinding-Mills.]

In the Supplement for March, relating to the Steel-Works of Sheffield, we had occasion to notice some of the peculiarities of that town as a centre of manufactures. But we must now view it more closely. We must regard it as one great workshop for the production of cutlery and edge-tools—a huge factory which scatters its separate departments in different parts of the town, but still retains them all, like so many links in a chain.

If we take a Directory of Sheffield as an index to the employments of its inhabitants, we shall see that, although the distinct occupations are very numerous, there is yet a tie which connects most of them together: cutting instruments, of some kind or other, being the objects to which most of the manufacturing arrangements relate. There are Cutlery Casters, Table-knife makers, Fork-makers, Penknife-makers, Lancet-makers, Razor-makers, Scythe-makers, Saw-makers, Edge-tool makers, Scissor-makers, Shear-makers, Spade and Shovel makers: preparatory to all these are the operations of the Steel-converters, and Tilters, and Rollers, and Casters; subsidiary to them are those connected with the making of handles, such as Ivory, Tortoiseshell, and Pearl-dealers, Ivory-cutters, Horn Merchants and Dealers, Horn-pressers, Bone Merchants and Dealers, Bone-pressers; and lastly, there are numberless minor occupations which contribute in various ways to the manufacture of cutlery, such as Casting-pot makers, Mark and Figure makers, Razor-strop makers, Studders and Handle-ornamenters, and many others. It is true that other manufactures are carried on to a considerable extent; for instance, the immense supply of steel at hand affords facilities for the production of various articles, such as fenders, wire, anvils, hammers; the large use of horn for handles has led to the settlement of the comb manufacture at Sheffield; the supply of bone for handles has given rise to button-mould making; and there are considerable manufactures in white metal, including silver and its various imitations. But still all these are so far outweighed by the arrangements connected with cutlery, that the latter must be deemed the staple, the characteristic, the distinguishing feature of Sheffield industry.

Like as in other instances, Sheffield has grown up to its present distinction by gradual advances. At the time when archery supplied the use of fire-arms throughout England, Sheffield is stated to have been celebrated for the manufacture of iron heads for arrows: and it was known by Chaucer as a place where blades of knives were made; for a character in one of his poems is mentioned as being furnished with a "*Sheffield thwytel*" (whittle), a kind of knife which used in those days to be carried about the person. Rather more than two centuries ago the principal cutlers formed themselves into a body corporate, for the protection of the trade, and especially for the protection of the 'marks' belonging to each individual, with a view to guard against the piracy of

these marks by persons to whom they do not belong. It was about a century ago that the cutlery of Sheffield began to acquire such decided excellence as to raise it to a high rank. But it was not until the introduction of the mode of making cast-steel that this reputation reached its height; and at the present day it is not merely in the making of the steel, but also in the mechanical details of the manufacture, that the quality of the Sheffield steel goods is shown and appreciated.

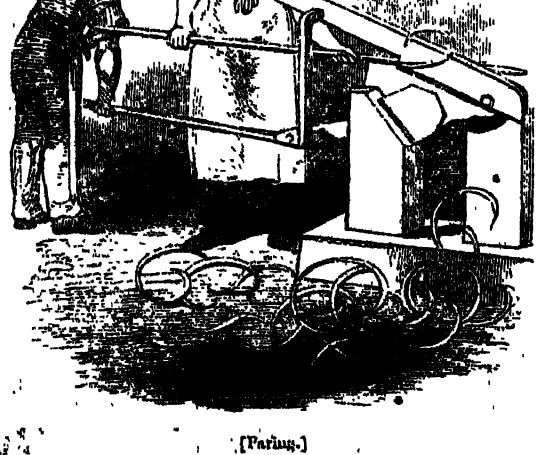
Perhaps the mode in which we may best glance at the cutlery manufacture is to take, one by one, a few cutting instruments as examples, and see what are the chief processes which they undergo. The limited space at our command will not admit of all the varieties being noticed; nor is this necessary, since the broad features of manufacture are pretty much the same in all. We will commence with a notice of

Saws;

which, whether included or not in what we generally term cutlery, hold an important place among Sheffield manufactures.

Saws of the commoner kind are made of thin sheet-iron, planished, or hammered all over to give a certain degree of stiffness and elasticity. Those of a better quality are made of shear-steel; while the best are formed of cast-steel. We will suppose that the last-named are the object of our attention. The flat ingots of steel, as cast in the manner described in our former Supplement, are rolled between ponderous steel rollers, while red-hot, into the form of sheets the proper thickness for a saw. Many of the Sheffield firms carry on no other occupation than this of rolling bars of steel into sheets.

When the sheets of steel are brought to the workshops of the saw-maker, his first operation is to cut the sheets into pieces the proper size for the saws to be made. This operation of cutting is performed by means of a very stout pair of shears of peculiar form. A man holds the sheet of steel in such a position that



[Paring.]

the shears may act upon it, moving the sheet from time to time as the cut extends; while another works the shears. The edges of the pieces of steel are then made quite straight by means of a grindstone; and matters are ready for the making of the teeth. This is not done by a file, as some may suppose; nor by stamping out all the teeth at one blow, as others may imagine; but each tooth is punched out separately. There is a kind of flat bench so arranged that a steel cutter works vertically against a steel die; and by placing the saw-plate between the cutter and the die, one tooth is cut



[Toothing Long Saw.]

out at each movement of the fly-press connected with the cutter. The saw-plate is then shifted a little, and another tooth cut out in a similar manner, and so on until the whole of the teeth are formed. These teeth of course vary in size and shape according to the kind of saw to which they belong. In the saws for an ordinary saw-mill the teeth are generally right-angled triangles; in the pit-saw the teeth are so formed as to meet the fibres of the wood at an acuter angle; while hand-saws and the generality of carpenters' and joiners' saws have teeth midway in form between the two other kinds. The teeth, after being cut, are finished up with a file, and the burr, or raggedness of the edge, is removed. The steel then undergoes the process of 'hardening,' which, at some stage or other, is the case with nearly all steel goods. The saws are laid flat in a furnace fitted for their reception, and heated to a degree determined by experience. They are taken out of the furnace, and immediately plunged into cold oil (or into some prepared liquid), whereby they are quenched, and made to acquire a sudden and very considerable degree of hardness.

When the saws, or 'plates,' as they are called, are removed from the hardening-trough, part of the oily mixture is wiped from the surface, while the remainder is dissipated by holding the saw over a clear coke fire; this heating at the same time gives the proper degree of temper or elasticity to the steel. While yet warm, the steel is hammered at different parts, to remove any warping or bending which it might have suffered. Then follows one of the most

noisy operations connected with the manufacture, viz. the 'planishing.' The saw is held in the left hand of the workman, rested on a small polished steel anvil, and hammered repeatedly on every part of the surface with a small hammer, whereby a clatter is produced from which a stranger gladly escapes. The object of this process is to make the saw true, even, and of equal elasticity in every part. The operation requires a great deal of dexterity; for the workman, by giving to the saw a kind of vibratory motion as he goes on, tests the elasticity and tension of the steel, and acquires by habit the tact of knowing where to strengthen the weaker parts by increasing the number of blows.

The saw is then carried to the 'wheel,' or grindstone, where both surfaces are ground all over, to reduce them to an even and regular state: this process having relation to the outer surface of the saw, while the planishing relates more to the internal texture. The grindstones employed for saws are of large size, sometimes as much as six or seven feet in diameter. The saw is too thin and flexible to be held against the grindstone as a knife would be; it is therefore fixed lightly to a board, and the board so held by the grinder (as sketched in our frontispiece) as to bring the saw in contact with the edge of the stone, shifting to and fro, until every part of both surfaces has been ground down level and true. As saws of the larger sizes could not be conveniently held in this way, they are suspended at both ends by cords from the ceiling, and swung backwards and forwards to bring them to the proper positions. The peculiarities attending this process are very exactly portrayed by Mr. Holland (in his Treatise on the Iron and Steel Manufacture), in the following words:—"It is not easy to conceive the idea of muscular exertion, imminent danger, and peculiarity of attitude presented to the eye; and the mind of an individual, who, unaccustomed to such a spectacle, looks at a saw-grinder when at work, standing on tiptoes over a great grindstone revolving with a fearful rapidity; his arms outstretched towards the extremities of the board under which lies the saw, and pressing against it with his knees to keep it in the closest contact with the surface of the stone; his person and dress appearing at the same time as if they had been dipped in an ochre-bed—present a picture of no common interest."

This grinding, though it gives one kind of regularity and equability to the saw, deranges it in respect to another; for the steel requires another planishing, or hammering on an anvil, to restore to it the flatness and straightness which the grinding had disturbed. After this second hammering, it is passed over a small coke fire till a particular and carefully tested degree of 'temper,' or elasticity, is given to it. Another grinding, but much slighter than the former, takes out the marks of the hammer, and gives a uniformity of appearance.

There next ensues a process so slight, so simple, and so soon ended, that it would seem hardly necessary to give it a separate place in the description; but it at the same time so remarkably illustrates the fact acquired by long practice, that a stranger is likely to be more struck with this than with any other part of the operations. If we look at the teeth of a saw, we shall see that half are bent in one direction, and half in the other; every alternate one being bent differently. This is done by the blows of a hammer, one blow to each tooth. The saw is rested flat on a steel anvil, and held by the left hand of the workman, who has a very small hammer in his other hand. With this hammer he strikes the sides of the teeth, one at a time: the weight of the hammer, the shape of the hammer-head, and the force of the blow, being just such as will enable one blow to give the required bending to the tooth. But the point worthy of note is the rapid and unerring manner in which the workman proceeds along the saw, *missing* every alternate tooth, striking one blow on each of the others, and yet advancing from one to another almost as fast as the eye can follow him. He then turns the saw over, and bends the other half of the teeth in a similar manner, but in an opposite direction. There is a kind of bevel or slope in the small anvil, to effect a bending in the teeth of the saw.

These are the main features, such as we witnessed at the Saw-manufactory of Messrs. Hoole and Unsworth. Several minor details we may pass over, and the making of the handles we shall slightly notice in a future page.

Table-Knives.

A table-knife is perhaps the most important of the different articles of cutlery—not from its quality, for a razor is more highly finished; not from its intricacy, for a clasp-knife has more detail about it—but from the large extent to which the use has risen. Every house in England, except the very humblest, has as many table-knives in it as there are inmates; and most houses have a great many more. When we consider, too, that table-knives, as well as other articles, have the art of wearing away, and that the industry and the brickdust of the housemaid greatly hasten this process; and when we look abroad to notice the avidity which all rude nations exhibit to gain possession of an English knife—we shall be prepared to regard this as a very extensive branch of Sheffield manufacture.

There is in most of the operations on steel goods a series of processes pretty constant in their general character. The forging, the hardening, the tempering, the grinding, the sharpening, the polishing—all form steps in most of the series, and bearing a certain resemblance in their general character. A table-knife, for instance, is forged out of a piece of steel of higher or lower quality according to the price at which it is to be sold. The very commonest are probably not steel at all, being simply bar iron; the next quality may be common steel, the next shear-steel, and the highest of all cast-steel. But whatever be the material, a length of bar is cut off, sufficient for one blade, and forged into shape. All the Sheffield forges are pretty much alike. They consist of a forge-fire kindled by bellows; and have a large block of stone or wood, serving as a bench, and provided with small steel anvils, stitheys, bosses, hammers, and other instruments necessary to the operation. The piece of steel is heated in the fire, placed on an anvil and hammered into form; being turned over and about in every direction, and the workman regulating his blows according to the form which he wishes to produce, reducing the thickness from one end to the other, and from one edge to the other. But this relates to the blade only; the 'tang,' or part which goes into the handle, is a separate part. To make this tang, the rudely formed blade is welded to a rod of iron, about half an inch square: and a sufficient length of this iron is cut off to form the tang, and also the 'shoulder,' or the projecting part between the tang and the blade. The end of the iron is heated and forged so as to be reduced in size sufficient to form the tang; and the shoulder is next brought into shape by hammering it in a kind of die or stamp called a 'swage.' The tang and the bolster being made, the whole is heated a second time, and the proper form and dimensions given to it. The blade is then heated red-hot, and plunged perpendicularly into cold water, by which a sudden hardening is effected; and a gradual heating afterwards to a certain point gives the 'temper' or degree of elasticity best fitted for the purpose to which table-knives are to be applied.



[Forging Razor-blades.]

When the knives are thus far prepared, they are carried to the grinding wheels, where the blade is ground all over on a large revolving stone; whereby the surface is brought level, the edges made straight, or at least regular, the point rounded or tapered as the case may be, and the edge sharpened. The grindstones made use of for grinding table-knives are between three and four feet in diameter, and about six inches broad upon the face. They are formed of a species of sandstone, and revolve with great rapidity, without at the same time greatly heating the articles being ground. The knives are ground first upon this stone, and afterwards upon one of finer texture called the 'whitening stone.'

Here it may be well to notice the customary arrangements at Sheffield respecting the grinding of steel goods. As the town is dotted here and there with '*Tilts*,' so is it likewise with '*Wheels*;' and in the one case as well as in the other the name is an abbreviation well known among the townsmen. A 'wheel' is a building fitted up with a large number of grindstones, each hired at a weekly or yearly rental, by a grinder, who grinds some kinds or other of cutlery for other persons. Before the introduction of steam-power, the grinding wheels were in most cases situated by the side of a fall in one or other of the rivers of Sheffield, so as to obtain the action of a water-wheel; and these structures often presented a picturesque appear- But in modern times large buildings have been ated for this purpose, amply provided with er. There is one building in particular, the shears Castle Mills, situated near the junction of to time as and the Don, which is especially calculated shears. Th quite strai to illustrate this arrangement. It is a large castellated structure—open to the objection, perhaps, of exhibiting a style of architecture wholly inconsistent with the nature of the mechanical operations going on within. There is a central court-yard surrounded by buildings, and at different heights are galleries running round, with doors opening into numerous apartments on all sides. The south side of the building is adjacent to the river Don; but a steam-engine supplies the moving-power. If we go into the rooms of this building, we find men employed in grinding all the various kinds of Sheffield steel goods. In one room are men grinding saws, in another table-knives, in another pen and pocket knives, in another forks, in another scissors, in another razors; employing grindstones of all sizes from four inches to seven feet in diameter, and of varying quality. All are brought into connection with the moving power by means of the usual mechanism; and it is on these revolving stones that the grinding is effected.

In such places as this Castle Mill every man confines himself pretty nearly to one kind of work, and pays a rental to the proprietor for the use of the room and the steam-power; or sometimes a man hires a whole room containing several grindstones, and either employs others to work for him or sublets some of the room. When walking round the gallery, and looking in one room after another, we may see the men in their cramped attitudes (for it is never an easy one) bending over the grindstones, and engaged from morning till night in grinding articles of cutlery or other steel goods. These goods are not their own, but belong to others, who merely employ them as grinders.

But to return to our table-knives. When the knives are ground, they are ready for 'glazing' or 'polishing.' This is performed on a wheel called a 'glazer;' consisting of a circular piece of wood, fixed upon an iron axis, and coated on the edge either with leather, or with a ring of metal consisting of an alloy of lead and tin. The leather-faced glazers, used for glazing table-knives, are first covered with a solution of glue and then with emery powder; and it is by friction against this slightly roughened substance that the glazing of the knife-blade and shoulder is effected. The extent to which this process is carried on has led to the establishment of 'buff and glazer makers' among the trades of Sheffield.

Forks.

Fork-making is not without its peculiarities among the departments of Sheffield industry. Most of the fork-makers live in the environs of the town; and indeed there are one or two villages almost wholly inhabited by these operatives. Forks are in most cases made of 'common steel,' that is, blister-steel which has been drawn out under the hammer, but neither sheared nor cast. They are forged out of rods about three-eighths of an inch square, in the following manner:—The tang and shank of the fork are first roughly formed, by hammering out the metal while in a red-hot state; and being again heated, the proper contour is given to them by means of a die and swage or stamp. The prongs are formed by stamping with a powerful punch acting on the principle of the pile-driving machine, but of course with a force proportionate to the work to be done. There is a large anvil fixed in a block of stone nearly on a level with the ground; to this are attached two rods of iron of considerable thickness, fixed about a foot asunder, perpendicular to the anvil, and reaching to the ceiling; the hammer or stamp, weighing about a hundred pounds, grooved on each side, slides up and down by means of the iron rods, which act as guides; a rope, passing from the hammer over a pulley, gives the workman the means

of raising the hammer; and lastly, the lower surface of the hammer and the upper surface of the anvil are each provided with a die or stamp adapted to the cutting of the prongs. The blank fork, being heated to a certain degree of softness, is placed on the lower die, and the hammer containing the other die is made to fall upon it from a height of six or seven feet. This forms the prongs and the middle part of the fork, leaving a very thin substance of steel between the prongs, which is afterwards cut out by means of a fly-press. The forks thus brought to the form so familiar to us, are annealed by heating in an oven and then gradually cooling, so as to acquire a softness sufficient to enable them to be filed all round and between the prongs. After this they are hardened, by being heated and suddenly cooled.

The grinding of forks is one of the most lamentable operations in the whole series of manufacturing processes, from its deleterious effects on the health. Forks are ground upon a dry stone, called the 'fork-stone,' formed of sharp grit of a whitish colour, very similar to that of which millstones are formed. The stone is about half a yard in diameter and two inches broad at the edge. The grinder sits on a 'horse' or stool, bends over the stone, holds the fork crosswise against the stone, and grinds all the parts of the surface to a smooth and even condition. If the stone were wetted, as in most other cases, the inconvenience would not be great, but the stone is kept quite dry, whereby not only is there a profusion of sparks given out, but the face and head of the grinder are enveloped in an atmosphere loaded with small particles of steel and grit-stone, which are inhaled into the lungs. Such is likewise the case in the process of needle-grinding; and in both instances the workmen infallibly fall victims to a distressing disease known as the 'grinders' asthma.' It is said that there are hardly any fork-grinders more than forty years of age, since the disease carries off most of them before they reach that time of life. When describing the Needle-manufacture at Redditch, in the Supplement for January, 1843, we alluded to the laudable endeavour of Mr. Abraham of Sheffield to devise a remedy for this sad evil, by placing a shield of magnets in front of the grinder's mouth, whereby the small particles should be arrested and prevented from entering the lungs. Another plan has been suggested by a Mr. Elliot; which consists in the adoption of a long box or wooden chimney, placed opposite to and partially covering the grindstone in front, while the other extremity is carried through a hole in the wall. In this arrangement it is said that such a current of air is excited by the mere revolution of the stone as to carry the dusty particles through this funnel into the open air outside the building. Yet both these plans have been rejected by the workmen, and so have all others having for their object the amelioration of this employment. Whether it is that the contrivances are very troublesome to arrange, or whether the grinders wish the occupation to remain unhealthy in order that wages may remain high (and both opinions have been expressed), certain it is that dry-grinding is still what it has ever been—one of the most disastrous occupations connected with the manufacturing arts; and it is equally certain that unless the men aid the attempts made for their comfort, all such attempts must be fruitless.

Pen and Pocket Knives.

A table-knife maker does not and probably cannot make a clasp-knife. He uses tools of different size, and his hand and his eye become accustomed to a kind of work from which he could not readily depart.

Penknives are generally forged by one man, with the hammer and anvil simply, the former weighing between three and four pounds, with a face or surface about an inch in diameter. The blade of the knife is first hammered out at the end of the rod of steel, and as much more is cut off along with it as is thought necessary to form the joint. The blade is then taken in a pair of tongs, and heated a second time to finish the joint part, a temporary tang or prong being formed at the same time. The blade is again heated, and hammered to a better and more correct form; and while yet hot, it is cut or stamped with a crescent-shaped chisel, to form the nail-hole, or notch by which clasp-knives are always opened. The blade is hardened by being brought to a red heat, and then dipped in cold water up to the shoulder.

The blades of pocket-knives, and of all other kinds of clasp-knives, are made nearly in the same way, and at a certain stage in the proceedings they are sent to a 'wheel' to be ground; after which they are 'glazed' on a leaden wheel coated with emery; and the finer kinds are still further polished on a circular piece of wood covered with buff leather, and coated with a paste or composition.

The finishing of a penknife is a curious instance of minute detail. When the pieces of ivory, pearl, tortoiseshell, horn, or bone, which are to form the outer surface of the handle, are roughly cut to shape; when the blade has been forged and ground; and when the steel for the spring is procured,—the whole are placed in the hands of a workman who proceeds to build up a clasp-knife from the little fragments placed at his disposal. So many are the little matters which he has to attend to, that a common two-bladed knife has to pass through his hands seventy or eighty times before it is finished.

When we speak of an 'ivory-handled,' or 'pearl-handled' penknife, the ivory or pearl is said by the workman to form the 'outer scale' of the knife, and is only for ornament: the real foundation of the handle being the 'inner scale,' which is formed of metal. The spring is the piece of steel which, running along the back edge of the knife, separates the two scales or halves of the handle; and by its elasticity exerted upon the tang of the blade, it secures the blade in certain positions—closed, half-closed, or open. The inner scales and the spring are both forged to the workman's hands, and his office consists in putting all the pieces together. He works at a small bench near a window, and is provided with a number of tools to facilitate his operations—such as a vice, a small anvil, hammers, several files, steel burnishers, a drill-bow and drills for boring holes, a glazer coated with emery, a polisher coated with oil and rotten-stone, steel-plates to act as gauges in making holes through the various parts of the knife, and a number of other little appliances which we cannot enumerate. With the aid of these he shapes and adjusts his various pieces, fastens them with pins or rivets, files down these pins to give them a neat and level appearance, polishes every part after it is fixed; and, in short, he does to a penknife what a watchmaker does to a watch—he makes very few of the parts, but he adjusts them all. Our concluding cut sketches the penknife-cutters at an establishment of which we shall presently speak.

Razors.

Here we come to a species of cutlery which has perhaps excited more attention than any other: respecting which more has been written; and in the preparation of which more care is taken. Commercially speaking, this department of manufacture is not so important as that of table-knives, from its much more limited application; but the good quality requisite to the fit action of a razor has made it an object of moment both to the steel-maker and to the cutler.

The blade of a razor is forged much in the same manner as the blade of a knife, but from steel of a particular quality. The rod of steel is heated at one end, and hammered into a shape bearing a rude resemblance to that of a razor. The concavity of the surface is produced by hammering the blade on the rounded edge of the anvil. The piece is then cut off, with an additional length sufficient to form the tang for insertion in the handle. The quality of the metal is required to be peculiar on this account, that the thickness of the back and the edge of a razor differs so greatly, that much hammering is necessary to produce the latter, and the hammering can only be borne by good metal. Some razors are made with a straight edge, some with a convex edge, some of equal breadth throughout, some wider at the point than near the handle, some short and broad, some long and narrow; but these are all differences to suit individual taste, and have little to do with the real quality of the razor.

Razors are generally tempered before they are ground; but sometimes ground before they are tempered. They are ground upon very small stones, often those which have been worn away to too small a size for other grinders. The reader may perhaps have seen or heard of razors *ground upon a 4-inch stone*; this character being mentioned as a test of excellence. What is here meant may be explained as follows:—every razor is concave or hollow on the surface; this concavity must be produced or maintained in grinding by the use of a stone equally convex. When a stone four inches in diameter is employed, it must give to the razor a corresponding concavity, or a curve of two inches radius; and it is evident that this can only be produced by wearing away the substance of the razor in such a way as to give a very thin edge. Now the thinner the edge, the finer and sharper can it be made in the process of 'whetting;' and hence there is an inference that, other things being equal, a razor "ground on a 4-inch stone" will yield a keener edge than one ground on a stone six, eight, or ten inches in diameter. On the other hand, any man who is blessed with a strong wiry beard will find that a very fine and delicate edge is spoiled almost immediately by it; he must have a razor whose edge possesses strength as well as keenness; and such a one must have been ground on a stone larger than four inches in diameter. Taking all these points together, therefore, it seems probable that the concavity of a razor ought to bear some relation to the kind of beard with which it is to be brought in contact; and that a medium concavity, produced by grinding the razor on a stone six or seven inches in diameter, is more likely to be generally serviceable than any other.—If the reader knew how many "Essays on Razors" have been written, and how earnestly all these points are discussed, he would see that they are not deemed so trifling as might at first appear.

The tempering of a razor is not less important than the grinding, since the fineness and durability of the edge depend greatly on it. This tempering, as we have before had occasion to observe, is given by exposing the article to a certain temperature, and then allowing it to cool gradually. This temperature is matter of experience. No one seems yet to know why a particular temperature gives a particular temper; there is no known general principle which pervades all the applications; and therefore each cutler or workman uses such a heat, and tests it by such signs, as seem best to accord with the result of his own experience. In general, the *colour* which the steel attains while hot is taken as the test, each kind of cutlery having a colour best fitted for itself. Others endeavour to use a thermometer to direct their proceedings; and we give the following table to show how the two have sometimes been worked out together:—

Fahr.	Colour.	
430°	Slight yellow	Fitted for razors and lancets.
450	Pale straw	
470	Yellow	Penknives.
490	Brown	
510	Brown, with purple spots	Pocket-knives
530	Purple	table-knives
550	Bright blue	scissors.
560	Blue	Springs.
600	Blackish blue	

We only give this as one instance of an attempt at system; for almost every distinguished cutler has favourite views of his own respecting the tempering of cutting instruments.

The razor, when ground, tempered, and polished, is fitted into its handle by means similar in character to those employed in handling penknives, but less complex.

It may be remarked, that among the points yet undetermined concerning the quality of razors, the condition of the iron whence the steel is made has not yet been fully understood. It has been supposed by some that steel, or the iron from which it is made, is improved in quality by being buried in the earth for a long time. A curious instance occurred a few years ago in illustration of this opinion. An eminent London cutler, having buried some razor-blades for three years in the earth, and having formed an opinion that the quality was greatly improved thereby, was desirous of obtaining some iron or steel which had been so buried for a much longer period. It happened that about that time old London Bridge was pulled down, and all the piles were found shod or pointed at the lower end with iron, which had been thus immersed in the earth for many centuries. The cutler bought all this iron fifteen tons in weight, and had it converted into steel. The thicker portions yielded indifferent steel; but the thinner, which were both more sonorous and more tough than any other iron known, produced a kind of steel superior, it is said, to any that the cutler had previously known; so that it was said at the time, "We might mow our beards with a relic of old London Bridge."

It may be added, that iron is occasionally made of so good quality that it is capable of being formed into razors without previous conversion into steel. We have seen one made of Butterley iron, capable of rendering moderate, if not excellent service.

Scissors.

These implements of cutlery, though appearing to the eye more complex than knives and razors, are produced in a way very similar to them. In forging scissors, each half is of course made separately, by the aid of the forge, the hammer, and the anvil. The anvil of the scissor-forger is rather a large block of steel, having grooves on its surface for admitting various little indented tools called *bosses*. One of these bosses assists the workman in giving a proper figure to the shank of the scissors; another for forming that part which is to receive the rivet; and a third for giving a proper figure to the upper side of the blade. There are also contrivances to assist in giving shape to the bow or handle of the scissors.

The shank of the scissors is first formed by means of one of the bosses, leaving as much steel at the end as will form the blade; and a small hole is punched, to form the first semblance of the bow or handle. The form of the blade is then given, and the piece cut off from the bar of steel. The small hole is next enlarged,

by various implements, to the form and shape of the bow.

When many are thus forged, they are annealed to a state of greater softness, grouped together in pairs, and filed regular in all those parts which the grindstone cannot reach. The rivet-hole is then bored; and after being hardened and again tempered down to a particular point, they are sent to the wheel to be ground. The grindstone employed for small scissors is about the same size as that used for penknives; but the outer surface is ground on a larger stone. After the grinding, the scissors are glazed, and afterwards polished, if they be of the best kind. Since there are parts of the scissors which cannot be reached by the glazing and polishing wheels, a small wheel is employed having hard brushes on its circumference, the bristles of which penetrate to the intricate parts of the scissors, and polish them by means of emery or crocus.

As scissors are made from a farthing a pair to ten guineas a pair, every possible stage in the process, and every shade of difference in the quality of the material employed, are made to bear a proportion to the price at which the article is sold; but the above sketches forth the general routine. In large scissors the face of the blade only is made of steel, all else being made of iron; in cheap articles, the metal is cast at once into a scissor-mould, so as to save the expense of forging; in the costly kinds, the handles are chased, or etched, or studded with small ornaments, or inlaid with gold—according to the value placed upon them.

Handles.

We have more than once had to speak of the handles for knives, razors, and other articles of cutlery. These form an important and extensive department of Sheffield industry, leading to a vast consumption of material.

According to the technical phraseology applied, all handles are called *hafts* in which a tang of the knife passes into a hole in the handle, and is there fixed; while the handles which are formed of two flat pieces riveted to a central plate, as in penknives, are called *scales*. A 'haft and scale maker,' therefore (one of the trades of Sheffield), is in fact a handle-maker.

The workmen who engage in this employment confine themselves each pretty nearly to one kind of material. The pearl-handle makers procure the shells from the shores of India and Africa; these shells are about six inches in diameter, and are so extremely hard that they have to be wetted while being cut with a saw, to prevent the saw from being softened by the heat. This is a dirty occupation, and is accompanied by a

"——— very ancient and fish-like smell,"

elicited by the heat from the shell itself. The pearl, or rather mother-of-pearl, is cut up into thin slices, to be afterwards used for the scales for penknives, razors, &c. *Ivory* handles are made by sawing up elephants' tusks into the most useful pieces they can make, by means of a circular saw. If the ivory is for scales, it is cut into veneers; but if for hafts, it is cut into small oblong pieces, which are afterwards brought to shape by hand, polished, and pierced for the reception of the tang. *Bone* handles are similarly made by cutting with a small circular saw, and then filing into shape: and the same may be said of *ebony* and fancy-wood handles generally. *Saw-handles* are cut out of wood, which, after being planed to the proper thickness, is fixed in a vice, cut with a very fine saw, smoothed with files and glass-paper, pierced with rivet-holes, and riveted to the saws. *Metal* handles are, of course, made in a way similar to other articles of metal.

Horn handles have a peculiarity in their mode of



[Cutting Ivory Handles with Circular Saw.]

manufacture, which places them in a distinct rank. When horn is made hot, it becomes so soft and ductile that it may be pressed into moulds; and this circumstance is taken advantage of to give an ornamental device to horn handles, except *stag's-horn*, which is left in its natural state. The tips or solid part of ox-horn and buffalo-horn are made into hafts, while the other parts are made into scales. The mould for pressing is in two halves, which close together like a pair of pincers; and this mould has the device on each of its halves. The mould is heated in a fire; the piece of horn is cut nearly to the requisite size, and put into it; and the mould is pressed in a powerful vice, whereby the horn receives the impress of the device.

There is also a good deal of skill shown in staining horn, bone, and ivory, or in bleaching them: as also in studding and ornamenting them in various ways.

System of Manufacturing.

All these departments of Sheffield manufacture, and others which we have not particularly noticed, are in themselves separate branches, and are only united in respect to the larger merchants and manufacturers. These manufacturers buy the steel from one or more firms, have it forged by another or several others, ground by others, and finished by others; or they will purchase ready-made goods from smaller manufacturers; or they sometimes advance money to workmen to purchase material, and then agree to give a certain price for the articles. In short, there are several modes of conducting the manufacture, but the *factory*

system is not one of them. By this we mean, that there is no large building, under a central authority, in which a piece of steel goes in at one door, and comes out at another converted into knives, scissors, and razors. Nearly all the articles of cutlery made at Sheffield travel about the town several times before they are finished.

There are, however, a few large firms which, besides selling all the various kinds of cutlery, manufacture largely on their own premises. The firm of Messrs. Rodgers and Co. is one of these. On visiting the show-rooms of this establishment a stranger can hardly avoid being struck by the display of manufacturing skill which meets the eye. Sheffield has long been the head-quarters of the cutlery trade; and we here see examples of what Sheffield skill can produce. Besides the bulk of manufactured articles, such as we find a sale in the common course of business, there are three or four highly curious specimens of workmanship to be seen. One is a clasp-knife not more than an inch in length when closed, and yet containing seventy-five blades, all perfectly and properly formed, and resembling in shape such as are customarily used in clasp-knives, but on quite a miniature scale. Every blade has its spring, hinge, rivet, and other appendages, so that it forms altogether a tiny, yet multitudinous knife. Another specimen is about two feet in length, and contains the enormous number of eighteen hundred and forty-one blades! It was made a few years ago, and then contained blades corresponding in number with the year in which it was made; since then a few others have been added; and it is, we believe, contemplated to bring up arrears by shortly increasing the number to eighteen hundred and forty-four, so that this may be a sort of a Sheffield almanac and a specimen of Sheffield knife-making at the same time. The blades in this splendid group are about the usual size. A third specimen, though having less than this number of blades, eclipses the other two in beauty. It is placed in a glass case on a rotating stand, and is about thirty inches in height. It contains two hundred and twenty blades, all of large size, and most of them exquisitely engraved, or rather etched, with portraits of distinguished persons, views of the chief buildings in Sheffield, and other subjects. These pictures being of a dead white appearance, on steel having the most brilliant polish that art can impart to it, and being skilfully done in respect to drawing, the whole assemblage is strikingly beautiful. Such parts of the handle as present a flat surface are of pearl, studded with jewels; and it is said that a sum of between seven and eight hundred guineas was expended in wages alone in the production of the knife!

Many persons may perhaps occasionally have seen curious little specimens of cutlery, in which the object seems to be to try how much can be done in a small space. One such is included among the curiosities of this show-room. It consists of a group of ten pairs of scissors, each complete in itself, each about one-tenth of an inch in length, and the whole ten weighing rather less than a grain; or (to give a familiar standard) it would take nearly five hundred such pairs of scissors to weigh as much as a silver sixpence!

With respect to the workshops of this firm (excluding those relating to the manufacture of plate and plated goods, which we do not notice here), they exhibit many of the branches of manufacture which have been occupying our attention. There are ranges of forges, and other portions of the apparatus for manufacturing cutlery. Yet even in this establishment it would be impossible to trace the manufacturing history of a knife without following it to other workshops in Sheffield. And such may be said of the larger firms generally, as well as the smaller ones. Each class of manufacturers is so dependent on the others, and there is such a chain of links connecting them all, that we have found it convenient to speak of Sheffield as one huge workshop for steel goods.



[Penknife Cutlers, Messrs. Rodgers's, Sheffield.]



[The Battle of the Standard.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXIV.

Lionardo da Vinci: b. 1452; d. 1519.

We approach the period when the art of painting reached its highest perfection, whether considered with reference to poetry of conception, or the mechanical means through which these conceptions were embodied in the noblest forms. Within a short period of about thirty years, *i. e.* between 1490 and 1520, the greatest painters whom the world has yet seen were living and working together. On looking back we cannot but feel that the excellence they attained was the result of the efforts and aspirations of a preceding age; and yet these men were so great in their vocation, and so individual in their greatness, that, losing sight of the linked chain of progress, they seem at first to have had no precursors, as they have since had no peers. Though living at the same time, and most of them in personal relation with each other, the direction of each mind was different—was peculiar; though exercising in some sort a reciprocal influence, their influence never interfered with the most decided originality. These wonderful artists, who would have been remarkable men in their time, though they had never touched a pencil, were Lionardo da Vinci, Michael Angelo,

Raphael, Correggio, Giorgione, Titian, in Italy; and in Germany, Albert Durer. Of these men, we may say, as of Homer and Shakspere, that they belong to no particular age or country, but to all time, and to the universe. That they flourished together within one brief and brilliant period, and that each carried out to the highest degree of perfection his own peculiar aims, was no casualty. Nor are we to seek for the causes of this surpassing excellence merely in the history of the art as such. The causes lay far deeper, and must be referred to the history of human culture. The fermenting activity of the fifteenth century found its results in the extraordinary development of human intelligence in the commencement of the sixteenth century. We hear of "the spirit of the age," but in that wonderful age three mighty spirits were stirring society to its depths:—the spirit of bold investigation into truths of all kinds, which led to the Reformation; the spirit of daring adventure, which led men in search of new worlds beyond the eastern and the western oceans; and the spirit of art, through which men soared even to the "seventh heaven of invention."

Lionardo da Vinci seems to present in his own person a *resumé* of all the characteristics of the age in which he lived. He was *the* miracle of that age of miracles. Ardent and versatile as youth; patient and persevering as age; a most profound and original thinker; the greatest mathematician, and most ingenious mechanic of his time; architect, chemist, engineer, musician, poet, painter!—we are not only astounded by the variety of his natural gifts and acquired knowledge, but by the practical direction of his amazing powers. The extracts which have been published from MSS. now existing in his own handwriting, show him to have anticipated by the force of his own intellect some of the greatest discoveries made since his time. These fragments, says Mr. Hallam,* "age, according to our common estimate of the age in which he lived, more like revelations of physical truths vouchsafed to a single mind, than the superstructure of its reasoning upon any established basis. The discoveries which made Galileo, Kepler, Castelli, and other names illustrious—the system of Copernicus—the very theories of recent geologists, are anticipated by Da Vinci within the compass of a few pages, not perhaps in the most precise language, or on the most conclusive reasoning, but so as to strike us with something like the awe of preternatural knowledge. In an age of so much dogmatism, he first laid down the grand principle of Bacon, that experiment and observation must be the guides to just theory in the investigation of nature. If any doubt could be harboured, not as to the right of Lionardo da Vinci to stand as the first name of the fifteenth century, which is beyond all doubt,† but as to his originality in so many discoveries, which probably no one man, especially in such circumstances, has ever made—it must be by an hypothesis not very untenable, that some parts of physical science had already attained a height which mere books do not record."

It seems at first sight almost incomprehensible that, thus endowed as a philosopher, mechanic, inventor, discoverer, the fame of Lionardo should now rest on the works he has left as a painter. We cannot, within these limits, attempt to explain why and how it is that as the man of science he has been naturally and necessarily left behind by the onward march of intellectual progress, while as the poet-painter he still survives as a presence and a power. We must proceed at once to give some account of him in the character in which he exists to us and for us—that of the great artist.

Lionardo was born at Vinci, near Florence, in the Lower Val d'Arno, on the borders of the territory of Pistoia. His father, Piero da Vinci, was an advocate of Florence—not rich, but in independent circumstances, and possessed of estates in land. The singular talents of his son induced Piero to give him, from an early age, the advantage of the best instructors. As a child, he distinguished himself by his proficiency in arithmetic and mathematics. Music he studied early, as a science as well as an art. He invented a species of lyre for himself, and sung his own poetical compositions to his own music—both being frequently extemporaneous. But his favourite pursuit was the art of design in all its branches; he modelled in clay or wax, or attempted to draw every object which struck his fancy. His father sent him to study under Andrea Verocchio, famous as a sculptor, chaser in metal, and painter. Andrea, who was an excellent and correct designer, but a bad and hard colourist, was soon after engaged to paint a picture of the Baptism of our Saviour. He employed Lionardo, then a youth, to execute one of the angels. this he did with so much softness and richness of colour, that it far surpassed the rest of the picture; and Verocchio from that time threw away his palette, and confined himself wholly to his works in sculpture and design; "enraged," says Vasari, "that a child should thus excel him."

The youth of Lionardo thus passed away in the pursuit of science and of art: sometimes he was deeply engaged in astronomical calculations and investigations; sometimes ardent in the study of natural history, botany, and anatomy, sometimes intent on new effects of colour, light, shadow, or expression in representing objects animate or inanimate. Versatile, yet persevering, he varied his pursuits, but he never abandoned any. He was quite a young man when he conceived and demonstrated the practicability of two magnificent projects: one was, to lift the whole of the church of San Lorenzo, by means of immense levers, some feet higher than it now stands, and thus supply the deficient elevation;* the other project was, to form the Arno into a navigable canal, as far as Pisa, which would have added greatly to the commercial advantages of Florence.†

It happened about this time that a peasant on the estate of Piero da Vinci brought him a circular piece of wood, cut horizontally from the trunk of a very large old fig-tree, which had been lately felled, and begged to have something painted on it as an ornament for his cottage. The man being an especial favourite, Piero desired his son Lionardo to gratify his request; and Lionardo, inspired by that wildness of fancy which was one of his characteristics, took the panel into his own room, and resolved to astonish his father by a most unlooked-for proof of his art. He determined to compose something which should have a similar effect to the Medusa on the shield of Perseus, and almost petrify beholders. Aided by his recent studies in natural history, he collected together from the neighbouring swamps and the river-mud all kinds of hideous reptiles, as adders, lizards, toads, serpents; insects, as moths, locusts; and other crawling and flying obscene and obnoxious things; and out of these he compounded a sort of monster or chimera, which he represented as about to issue from the shield, with eyes flashing fire, and of an aspect so fearful and abominable that it seemed to infect the very air around. When finished, he led his father into the room in which it was placed, and the terror and horror of

* 'History of the Literature of Europe.'

† When we think of Lionardo's contemporary, Columbus, we feel inclined, if not to dispute this fiat of the great historian, at least to ponder on it—and those ponderings lead us far.

* Wild as this project must have appeared, it was not perhaps impossible. In our days the Sunderland Lighthouse was lifted from its foundations, and removed to a distance of several yards.

† This project was carried into execution 200 years later.

Piero proved the success of his attempt. This production, afterwards known as the "Rotello del Fico,"* from the material on which it was painted, was sold by Piero secretly for 100 ducats, to a merchant, who carried it to Milan, and sold it to the duke for 300. To the poor peasant thus cheated of his "Rotello" Piero gave a wooden shield, on which was painted a heart transfixed by a dart; a device better suited to his taste and comprehension. In the subsequent troubles of Milan, Lionardo's picture disappeared, and was probably destroyed as an object of horror, by those who did not understand its value as a work of art.

The anomalous monster represented on the "Rotello" was wholly different from the Medusa, afterwards painted by Lionardo, and now existing in the Florence Gallery. It represents the severed head of Medusa, seen foreshortened, lying on a fragment of rock: the features are beautiful and regular; the hair already metamorphosed into serpents—

> "which curl and flow,
> And their long tangles in each other lock,
> And with unending involutions show
> Their mailed radiance."

Those who have once seen this terrible and fascinating picture, can never forget it. The ghastly head seems to expire, and the serpents to crawl into glittering life, as we look upon it.

During this first period of his life, which was wholly passed in Florence and its neighbourhood, Lionardo painted several other pictures of a very different character, and designed some beautiful cartoons, of sacred and mythological subjects, which showed that his sense of the beautiful, the elevated, and the graceful was not less a part of his mind than that eccentricity and almost perversion of fancy which made him delight in sketching ugly, exaggerated caricatures, and representing the deformed and the terrible.

Lionardo da Vinci was now about thirty years old, in the prime of his life and talents. His taste for pleasure and expense was, however, equal to his genius and indefatigable industry; and anxious to secure a certain provision for the future, as well as a wider field for the exercise of his various talents, he accepted the invitation of Lodovico Sforza il Moro, then regent, afterwards Duke of Milan, to reside in his court, and to execute a colossal equestrian statue of his ancestor Francesco Sforza. Here begins the second period of his artistic career, which includes his sojourn at Milan, that is, from 1483 to 1499.

[To be continued.]

A Model Farm.—The farm of Whitfield, belonging to Lord Ducie, is situated on the margin of the vale of Berkeley, about thirteen miles from Bristol, on the road to Gloucester: a small part of it lies on mountain limestone and magnesian breccia; but the greater part is on a rich reddish loam derived from strata of sandy slate and clay, belonging to the old red sandstone formation, and naturally wet. In 1839, when Mr. Morgan began, it consisted of 232 acres, which had been let for a term of twenty-one years at a rent of 200*l.* per annum. The tenant had employed a capital of 726*l.* in its cultivation—68 acres arable, 164 acres in pasture; the total value of the produce was 463*l.*: the man lived in a poor way, and, after paying his rent and expenses, had a balance of only 28*l.* a year. The first improvement consisted of clearing away useless timber; 1771 trees were cut down from the fences, which being grubbed up and levelled, added 26 acres, or about 10 per cent. to the extent of the farm. Convenient roads were made; the brook was made straight and deepened, and the greater part of the farm thoroughdrained, subsoil-ploughed, and limed; new farm-yards were laid out, surrounded with stalls for feeding oxen, and sheds for sheep and hogs, and furnished with tanks to receive the drainage from the cattle-sheds and from the yard manure. A thrashing-machine, worked by a steam-engine, was placed contiguous to the rick-yard, from which the corn is brought by a small tramroad to the thrashing-house; and rooms adapted for steaming potatoes, and for slicing roots, which form a large portion of the food given to the stock of every kind, are placed as near as possible to the stalls. The entire outlay on these permanent improvements amounted to the sum of 7829*l.* In its improved condition the farm has been enlarged to 258 acres; it is now valued for the poor-rate at 364*l.*, and the capital employed in its cultivation is 1069*l.* The value of the produce is increased more than four times. The present turnip crops average 28 tons per acre, and the wheat 45 bushels, with 2000 cubic feet of straw. Not the least important point is the increased demand for labour. Under the old system, the farm employed two men, two women, and a boy, with an addition of four during twelve weeks of harvest. It now gives employment to eleven men, five women, and four boys, being more than three times the number employed before: add to this the labour applied to draining, making tiles, roads, buildings, and machinery, which, if completed in one year, would have fully occupied 300 labourers:—we need no further evidence than that Lord Ducie has afforded by this example farm at Whitfield, to prove that a large outlay of capital in thorough-draining, and providing the buildings, apparatus, and stock required for the improved system of high farming, may, in certain cases, add even fourfold to the productive powers of the land, with more than threefold employment for agricultural labourers. We must not, indeed, conclude that the whole of England is capable of such vast improvements: they are to be made only on soils naturally rich, and rendered unproductive through bad management and want of drainage, but of these we have at present a very large amount in those extensive western and central parts of England that are situate on strata of the red sandstone formation, and of which large masses still remain in a neglected state. One general principle carried out in Lord Ducie's farm is that of self-support by abundant home production and economy of manures. During winter, the animals are fed on roots, turnips, mangold-wurzel, carrots, and potatoes, all grown upon the farm, and on straw, and hay made only from clover and artificial grass crops; not a single acre is left for permanent pasture or meadow hay; and whilst one half of the farm is under tillage for white crops, the other half is occupied with green crops, arranged in such alternate order of succession as is most effective to renovate the land by the manurance of sheep folded on the green crops, and by well-administered supplies of solid and liquid manures from stall-fed cattle.

On Lying.—In plain truth, lying is a hateful and an accursed vice. We are not men, we have no other tie upon one another but our word. If we did but perceive the horror and ill consequences of it, we should pursue it with fire and sword, and more justly than other crimes. I see that parents commonly, and with indiscretion enough, correct their children for little innocent faults, and torment them for wanton childish tricks that have neither impression nor tend to any consequence; whereas, in my opinion, lying only, and, what is of something a lower form, wilful obstinacy, are the faults which ought, on all occasions, to be combated, both in the infancy and progress of these vices, which will otherwise grow up and increase with them; and, after a tongue has once got the knack of lying, 'tis not to be imagined how unpossible almost it is to reclaim it. Whence it comes to pass that we see some, who are otherwise very honest men, so subject to this vice. I have a good fellow for my tailor, who, yet, I never knew guilty of one truth; no, not even when it had been to his advantage. If falsehood had, like truth, but one face only, we should be upon better terms; for we should then take the contrary to what the liar says for certain truth; but the reverse of truth has a hundred thousand shapes, and a field indefinite, without bound or limit. The Pythagoreans make *good* to be certain and finite; *evil* infinite and uncertain; there are a thousand ways to miss the white, there is only one to hit it. For my own part, I have this vice in so great horror, that I am not sure I could prevail with my conscience to secure myself from the most manifest and extreme danger by an impudent and solemn lie. An ancient father says that a dog we know is better company than a man whose language we do not understand. *Ut externus alieno non sit hominis usus.* And how much less sociable is false speaking than silence?—*Montaigne's Essays, by Cotton.*

* *Rotello* means a shield or buckler; *Fico*, a fig-tree.



[Gardens of the Royal Botanical Society, Regent's Park.]

PUBLIC GARDENS OF LONDON.

The history of the public gardens in and near London, since the sixteenth century, illustrates, with tolerable completeness, the history of the changes of taste in gardening, and the general tenor of its progress. During the reign of Charles II., Greenwich and St. James's Park were laid out under the direction of the eminent French landscape designer, Le Nôtre, who had been invited to this country by Charles, with the express view of introducing the splendid French style, and many of his subjects were not slow to profit, each according to his means, by the example. Kensington Gardens were commenced by William III., who stamped upon them the impress of his own, and, we believe it may be added, the national tastes of the time. From notes made on the gardens round the metropolis, by J. Gibson, in 1691, it appears the sovereign's example was still followed with dutiful exactness; the characteristics of them all were terrace walks, hedges of evergreens, shorn shrubs in boxes, and orange and myrtle trees. Kensington Gardens as yet comprised but twenty-six acres, to which Queen Anne added thirty more, and caused them to be laid out by Wise, who turned the gravel-pits into a shrubbery, with winding walks, and was compared by Addison to an epic poet for so doing. It was about this time that there arose in different quarters a more natural taste in gardening, and which, as the commencement of our present system, has excited considerable interest and a great deal of not very conclusive discussion. One of the sources to which this taste is attributed by foreigners is odd enough—the Chinese; but our own poets seem much better entitled to whatever amount of credit may be justly assignable to any particular quarter. From Bacon downwards, we find them exercising a steady and growing influence to this end. That greatest of prose poets expressly inculcated the adding to our gardens rude or neglected spots as specimens of wild nature, and he placed gardening on a higher elevation than was dreamed of by any one else in his time. Waller, at his residence at Beaconsfield, is said to have presented more than usual evidences of natural taste. Addison is the author of the paper 'On the Causes of the Pleasures of the Imagination, arising from the works of Nature, and their Superiority over those of Art,' which appeared in 1712; and Pope, of that in which the verdant sculpture school is unmercifully attacked in the 'Guardian,' and who, in his epistle to Lord Burlington, laid down the opposite principles that were to be cultivated—the study of nature, the genius of the place, and never to lose sight of good sense; then Thomson, by his 'Seasons,' did admirable service to the cause; and lastly, Mason published his poem on the English Garden.

The first artist who appreciated and accepted the new faith was Bridgman, who banished verdant sculpture from the royal gardens, introduced 'ha-has' instead of walls for boundaries, and portions of landscape scenery, in accordance with Bacon's ideas, but the clipped alleys were still left to be clipped. Kensington Gardens, under his superintendence, were now further enlarged, by the addition of no less than three hundred acres taken out of Hyde Park, and the Serpentine was formed from a series of detached ponds. This was considered a very bold experiment. An amusing evidence of the state of the general ideas on the subject of garden or landscape scenery is given by Mr. Loudon:—"Lord Bathurst informed Daines Barrington that he was the first who deviated from the straight line in made pieces of water, by following the natural lines of a valley, in widening the brook at Ryskins, near Colnbrook, and that Lord Strafford, thinking that it was done from poverty or economy, asked him to own fairly how little more it would have cost him to

have made it straight." But there is an older claimant to the honour of the serpentine form—Sir Christopher Wren's father, who proposed to "reduce the current of a mile's length into the compass of an orchard," and to employ the enclosed space to purposes of "gardenings, plantings, or banquetings, or aery delights, and the multiplying of infinite fish in a little compass of ground, without any sense of their being restrained." Bridgman was succeeded by Kent, who, whilst his sculpture and his paintings have sunk into merited oblivion, seems to be recognised as the first true English landscape artist, a circumstance attributed, in a great measure, and no doubt correctly, to his studies as a painter. Walpole's opinion of him is high indeed: Kent was, he says, "painter enough to taste the charms of landscape: bold and opiniative enough to dare and to dictate, and born with a genius to strike out a great system from the twilight of imperfect essays, he realised the compositions of the greatest masters in paintings." Claremont and Esher were both laid out by Kent.

The oldest Botanic gardens in England are those of Oxford and Chelsea, the last belonging to the Apothecaries' Company as early as 1674, and remaining in its possession to this day: being maintained by the Company for the use of the medical schools of London. Evelyn, who visited it in 1685, mentions as rarities he saw there a tulip-tree and a tea-shrub. Here one of the earliest attempts to supply plants that required it with artificial heat appears to have been made, the greenhouse having been heated in 1684, according to Ray, by means of embers placed in a hole in the floor. We must add to our brief notice of the Chelsea gardens, that it was here that the "Prince of Gardeners," as Linnæus called him, Philip Miller, the author of the admirable 'Gardeners' Dictionary,' spent nearly fifty years, having taken the management in 1722, and only resigned it a little before his death in 1771. The first Arboretum was that of Kew, established in 1760, through the influence of the Dowager Princess of Wales.

It is from the period of peace—1815, that we may date the commencement of the present extraordinary prosperity of English gardening: and of which the Horticultural Society, founded in 1820, must be looked upon as the chief moving impulse. 'The Royal Botanic Society of London' is of a more recent date, and was incorporated between three and four years ago, for the "promotion of Botany in all its branches, and its application to Medicine, Arts, and Manufactures, and also for the formation of extensive Botanical and Ornamental Gardens within the immediate vicinity of the Metropolis." The grounds of the Society are in the Regent's Park, and consist of eighteen acres, which were previously in the possession of a nurseryman, and then formed an almost level surface, the only noticeable deviation being the slight slope of the ground westward. In stepping into the grounds, now, the change is truly surprising, and we do not know where our readers could more readily obtain a practical example of what may be done in picturesque landscape gardening, on the most unpromising sites. As we enter, on one of the evenings devoted to the promenade, as it is called, a pretty rustic screen of ivy intercepts, for a moment, the view of the interior,—which passed, we find ourselves on a very broad gravel walk, adorned at each end with large vases on pedestals. As we pace along this walk we have, on the right, a picturesque-looking mound rising to some considerable elevation from the midst of the irregular grounds about its base, and on the left lawns and shrubberies, behind which the winding walks disappear into the lower grounds beyond, where occasional glimpses may be obtained of a brilliant parterre of flowers. At the end of the walk we ascend a flight of steps, to what is called the Terrace, where, perhaps, one of the most interesting buildings yet contrived for the protection of plants requiring, in this country, an artificial climate, is about to be erected. This is an immense winter garden, entirely covered with glass, where some three or four thousand persons may be able at once to move about the varied surface, ascending or descending the different walks,—above all, enjoying the novel effect produced by passing from the hardy plants and temperate atmosphere of their own country in the gardens without, gradually through a warmer and warmer air, each portion having its own suitable vegetation, till, at last, they reach the tropical regions of the extremity, and find themselves in the country of palms, and other such magnificent inhabitants of the East. Turning now to the right, the walk leads us to a piece of ground for the reception of plants used or useful in medicine. Another piece of ground here is devoted to the collection of the chief agricultural plants. But the most generally attractive of the whole will be the garden of hardy plants from all parts of the world, lately formed, and which already contains three thousand, and will receive at least seven thousand more.

Returning to the terrace, we pass to the lower grounds on the opposite side of the terrace, where the irregularities become more decided. Every few yards the scene changes. Now we descend into a rocky dell, spanned by an arch of rocks, and with a cave, in character with the whole, at one side; then a little rude bridge takes us across a stream winding sluggishly along between its reedy banks; then, a few yards farther, and we are in a kind of amphitheatre, devoted to the growth of the beautiful American plants, or those requiring peat soil, the rhododendrons, kalmias, azaleas, andromedas, &c. &c. Many other interesting floral compartments adorn this part of the grounds, among them a rosary, in which, however, the plants are as yet too small to be effective. Here, too, is the Secretary's office and residence, in a picturesque little building, with a richly furnished lawn in front, and a fine shady grove, with a cast of Diana and the Hart, at one side. The only other part of the gardens that we can here mention is the mount, with its winding walks of ascent, at the foot of which are numerous masses of interesting geological specimens. From the summit we obtain by far the finest view of the whole of the gardens, which from hence have really a charming effect; whilst beyond them, if we look in one direction, we have the handsome terraces of the Park, backed by impenetrable masses of houses, and in another, the ever-beautiful "sister hills" of Hampstead and Highgate.

THE ATMOSPHERIC BUDE-LIGHT.

About four years ago (No. 515), we gave a brief account of what at that time constituted the Bude-light; explaining that it was a peculiar mode of aiding the combustion of oil by a stream of oxygen gas; that it received its name from the residence of its inventor, Mr. Gurney, in Cornwall; and that it was tried in the House of Commons. Since that time changes of a remarkable character have been made in the nature of the light; so much so, indeed, that it seems doubtful whether the same name ought to be applied to it. The addition of the word "atmospheric" to the name, however, may remove this objection. Instead of oil being the combustible, and oxygen the supporter of combustion, street-gas is now the combustible, and atmospheric air the supporter.

When the original Bude-light was used in the House of Commons, in the early part of the session of 1839, it was regarded as an experiment, to be retained or

rejected as the House might afterwards think fit. The lights employed were first placed in the ceiling of the House; after which they were lowered to a distance from the ceiling, and various other arrangements were made with a view of testing the best position for them. In all these instances the lamps were supplied with oil, and the flame was excited by a stream of oxygen prepared from the oxide of manganese. A sloping ceiling of a peculiar kind having been constructed, with a view to the ventilation of the house, it was suggested that the Bude-lights should be placed above the glass of this ceiling, and shine down through it: but the loss of light through this immense field of glass was so great, that the plan was abandoned as inexpedient. To limit this loss, there were next arranged seven lights on each half of the false ceiling, so placed as to throw down light where it was most wanted. A few weeks after this modification, a vote of the House decided that the experiments should stop, and that the use of wax candles should be renewed.

A subsequent vote of the House, by which the experiments were renewed, led to the changes in the nature of the light itself. The lights in or above the false ceiling having been objected to, Mr. Gurney placed two pendants hanging from the ceiling downl into the body of the house, and surrounded them by large and extensive surfaces of ground glass, so as to soften and subdue the light. But here a difficulty occurred: it was found that the use of liquid oil in such a situation, involving the occasional trimming of the lamps, would be almost impracticable; and also that the pipes conveying the oxygen to the flame would render it very difficult to raise and lower the lights. There was then an arrangement made for using oil-vapour instead of liquid oil, and this seeming to be successful, oil-gas was tried. These attempts led to the inquiry how far the common street-gas might be employed; and as there had been gas-pipes laid along the upper part of the house at a former period, Mr. Gurney purified the gas procured from this source, and substituted it for the oil.

Another point related to the substitution of atmospheric air for oxygen as a supporter of the combustion. The oxygen was made from manganese; and as great trouble, expense, and inconvenience were often experienced in procuring that mineral—as, too, the use of oxygen involved a certain complexity in the arrangement of the light, Mr. Gurney was led to adopt other means; and acting on the result of experiments made by him several years before, he came to a conclusion that the common air of a room, if brought to act on a gas flame in a particular manner, might produce a result vastly superior to that commonly produced in gas-lights. His plans were practically carried out; and so well did they succeed, that Mr. Gurney took out a patent for certain portions of the method.

Thus arose, by gradual improvements, the Atmospheric Bude-light, which is now very much used in large buildings. The improvements depend on many different points, all of which contribute to the object in view. In the first place, the common street-gas, although considerably purified at the gas-works, requires more purification before it is fit for use in this method. The gas used in the London streets is less pure than that used at Edinburgh and Glasgow, on account of the coal from which it is produced containing more sulphur; and it requires a high temperature before it will ignite. By passing this gas, however, through certain chemical ingredients, Mr. Gurney brings it to a state of purity which enables it to ignite at a much lower temperature; whereby, among other advantages, less heat is given out by the flame when kindled.

It may here be remarked, that the opposite qualities of gas as to yielding *light* and *heat* are not much attended to in London. The late Sir John Robison, secretary to the Scottish Society of Arts, pointed out very clearly how much more useful coal-gas might become if more skill were shown in its management. In a paper read before that Society, Sir John alluded to the popular opinion, that the more freely a current of air is admitted to a gas-light, the better the light will burn; and exposed the fallacy by showing "that there is only a certain proportion of air required for the favourable combustion of a definite measure of gas. If more air than this due proportion be allowed to pass up the [glass] chimney, the size of the flame will be reduced, and the quantity of light diminished; if, on the other hand, less than the due proportion be admitted, the surface of the flame will be increased by elongation, but it will become obscure, and the quantity of light will decrease, owing to the escape of particles of unconsumed carbon. A simple experiment will exemplify this:—If the flame of an ordinary Argand burner be reduced, by partially shutting the cock, to about half an inch high, the light will be pale and blue, because the supply of air is too great for the small quantity of gas which is issuing. If partial obstruction be given to the access of air, by applying a handkerchief under the burner and chimney, it will be found that the size of the flame and the quantity of light emitted will increase until it arrive at a maximum, when, by further obstruction, the admission of air will be reduced below the proportion required for the burning of the carbon, and the light will diminish."

The blue part of a gas-flame, alluded to in the above remarks, emits great heat and little light, and is therefore an evil where the gas is employed for illumination. Mr. Gurney arranges his plans so as to have little or none of this blue portion; while Sir J. Robison, having in view the production of a very convenient gas-cooking stove, arranged an apparatus for producing a highly heated but dimly illuminating flame. He wanted a substitute for French charcoal-stoves in his own house, and employed gas in the following manner:—Each gas-stove consisted of a vertical cylinder, about thirty inches in height by three or four in diameter. Over the top of this was stretched a piece of fine wire gauze, having about thirty wires to the inch. A jet of gas entered near the bottom of the cylinder, and as it ascended to the top, it became mixed with the atmosphere. It passed through the wire gauze, and was kindled as it emerged at the upper surface. Each little mesh of the wire-cloth had thus its minute stream of gas, and all united to produce a flame which emitted heat without much light.

An attention to the peculiarities of gas in respect to light and heat forms one of the features in Mr. Gurney's arrangement. The air is admitted to the gas flame in limited quantity and in a peculiar manner. He thus described the principle of the method before the committee of the House of Commons:—"The mechanical principle by which the light is produced consists of a series of concentric rings, at definite distances from each other, and so arranged as to regulate the quantity of atmospheric air, and to communicate, by conduction and radiation, sufficient heat to raise the temperature of the gas to a given point, so as to effect the separation of its charcoal immediately as it leaves the burner; and then, by an arrangement above, to bring fresh atmospheric air at the proper points of the flame. A perfect lamp will deposit the charcoal in the flame the instant it passes the jet; an imperfect one will not. If so imperfect as to deposit too soon, charcoal will be found in the rings; if too late, then high up in the flame. There is a point of accuracy required, which practice has determined." Dr. Ure, in his evidence

before the same committee, explained that in the new arrangement the gas issues from two or more concentric series of holes, by which means the interior series, re-acting upon the exterior series of flames, produces a reciprocal augmentation of temperature, and thereby an increased light.

When the atmospheric Bude-light had been some time employed in the House of Commons, it became adopted in other large buildings; as its availability has been found more striking in large rooms than in small; that is, its advantages over the more usual forms of light are chiefly developed in large rooms where much light is required. Clapham Church is lighted by one large central burner, in lieu of the large number of gas-lights before employed. This burner has five concentric rings, each one pierced with a number of small holes; the outer ring is eleven inches in diameter; and when the jets from all the holes are kindled, there are five concentric cylinders of flame, separated by cylindrical spaces, up which the atmospheric air ascends to maintain the combustion. In Christ Church, Albany Street, seventy-two Argand gas-burners of the usual kind have been superseded by two of these new burners. St. Mary's Church, Spitalfields, is illuminated by one burner. St. Pancras Church, Regent's Square Church, Gordon Square Church, and about a dozen other churches in different parts of the metropolis, are now lighted by the atmospheric Bude-light. At the Reform Club House one of the libraries is lighted by the Bude-light, while the other exhibits an ingenious and beautiful light recently introduced by Mr. Faraday. The Senior United Service Club-House and Arthur's Club-House have the Bude-light; so also have the Stock Exchange, the Colonial Society, the London Institution, several of the London shops, and many public buildings in most of the large towns throughout the country.

The method, after being patented, was purchased by a Company, by whom it was practically carried into effect The burner and its appendages comprise the portion of the method to which this patent relates. There are the concentric rings, a glass cone which regulates the admission of air between these rings, a glass chimney to confine the products of combustion from passing out into the room, a horizontal disk to regulate the height and whiteness of the flame, and other appendages. There is, however, another feature which deserves mention. The glass chimney of the burner yields its gaseous and deleterious contents to a pipe, which, passing up to and along or through the ceiling, carries off the whole, and serves to ventilate the room. This pipe is generally so combined with the ornamental fittings of the apparatus, that it does not offend the eye by its appearance. At the Reform Club-House the pipe, after ascending in an ornamental form to the ceiling, passes along above the ceiling, and enters the chimney belonging to the fire-place of the room. The effect of such an arrangement is, that the vitiated air of a room is drawn powerfully upward into or between the concentric rings of the burner, there parts with all or part of its oxygen in the process of combustion, and thence escapes into the open air, carrying with it the gaseous products of combustion. These ventilating tubes have not, in their nature, any especial connection with the principle of the atmospheric Bude-light more than with others; but the reason why they are in practice more applicable in this than in other cases seems to be, that lights of less power, if suspended low enough in a church or room to illuminate the objects contained in it in a fitting manner, would be at such a distance from the ceiling as to render unpracticable any attempt to carry ventilating tubes from them to the ceiling; since there must be as many tubes as there are isolated burners in the room.

The Bude-light, when used on a large scale, yields more illuminating power with a given quantity of gas than the common burners. Professor Wheatstone made some experiments in the crypt of the House of Commons, from which he found that a Bude-light, consuming four times as much gas as a common gas-light, gave six and a half times as much light; so that for equal quantities of gas, the former gives more than half as much light again as the latter. The saving increases in importance as the light required is larger. For instance, if a small quantity of light were only required, the saving per cent. would be less than if a larger quantity were needed; so that in a very large room, such as the body of a church, its advantages are greatest of all. From some experiments made by Mr. Gurney (as stated in his evidence), he found that, taking the average market-prices, the expense to produce an equal intensity of light, would be—

With wax candles	41·0
„ composition ditto	33 0
„ sperm oil	23·0
„ common oil	11·3
„ common gas	7·2
„ atmospheric Bude	3·7

That is, if a given quantity of light from wax candles cost 41 pence, an equal quantity could be yielded by the atmospheric Bude for 3·7 pence, and so forth.

This light is not the only one that has recently resulted from an improved knowledge of the process of combustion; but it is one which, from the interesting steps whereby it has reached its present state, deserves a little attention as a successful example of the application of scientific principles to the useful arts.

PICTURES AND DEVICES ON WOOD.

There have from time to time been devised many different modes of producing pictorial effects on the surface of wood, independent of the usual mode of painting a picture on a panel: some of these relate to pictures in the sense generally conveyed by the term; while others relate to ornamental devices of a fanciful kind.

One of these modes is generally termed *buhl-work*, while another is known by the name of *marquetry*. They are both to a certain degree synonymous with *inlaying*. Buhl-work consists in inlaying small ornamental pieces of brass in polished wood furniture: while marquetry is the inlaying of variously coloured pieces of wood one among another. Originally the specimens of inlaying in wood consisted only of black and white pieces, and were called *moresques*; but an extension of the art was made by staining the pieces with various colours, so as to enable the artist to represent various natural objects. The discovery of America contributed to the art, by making known the existence of woods beautifully coloured in their natural state; and these agencies taken together led to the establishment of a favourite pursuit, called "painting in wood." A piece of well-dried oak or fir was first selected: and the coloured woods, being first reduced to thin leaves or veneers, were cut out to some ornamental form by means of a very delicate saw, and glued on the panel in conformity with the pre-arranged device. Various details in relation to this kind of inlaying, and the inlaying with stones or glass, which obtains the name of *mosaic*, will be found in our No. 487.

A very remarkable mode of producing a picture, by *scorching* the surface of a piece of wood, has been sometimes combined with the method of inlaying just noticed; while in other instances pictures have been formed by this method alone. When combined with

marquetry, the scorching is used to produce shadows, the blackness resulting from the carbonization of the wood. In the other cases, however, the whole of the device is produced by scorching. The panel used for this purpose is generally of some darkish tint and of a hard texture: and the scorching is effected by means of a heated poker, or bar of iron, or piece of wire. It will easily be conceived that much artistic skill is called for in such an art, since the scorched lines on the surface of the panel must not be made to give the outlines properly so called, but rather the shadows which bound this outline. If the panel has any strongly marked lines, fibres, knots, eyes, curls, or other diversities of surface, the artist avails himself of those to produce some of his pictorial effects, scorching around or near them, or across them, according to circumstances. We have heard of an instance in which a knot in the wood was made to represent the eye of a portrait, by a few judicious touches of the scorching iron around it; while a series of curled lines or grain-marks were taken advantage of to represent the furrows in the cheek of an old man. In the hands of a clever man, this method is capable of producing very bold and striking effects. One of the celebrated pictures by Quintin Matsys has been copied by these means.

Another method of producing wood pictures, or at least ornamental devices on the surface of wood, was that for which the Society of Arts awarded to Mr. Straker a silver medal a few years ago. This singular plan rests on the tendency which woody fibres have to swell when moistened with water, and to shrink in proportion as they dry; and part of the action is also due to the facility with which soft wood will suffer compression; so that in fact these two properties are combined thus—that if a depression be made by a blunt instrument on the surface of wood, such depressed part will again rise to its original level by subsequent immersion in water. The following mode is adopted to produce the desired effects:—The panel of wood, having been first worked out to its proper shape, is sketched with a design of the pattern to be imparted to it, either in pencil or by some other means. This being done, a bluft steel tool or die is applied successively to all those parts of the pattern intended to be in relief, and is pressed or hammered cautiously, without breaking the grain of the wood, till the depth of the depression is equal to the subsequent prominence of the figures. The ground is then reduced, by planing or filing, to the level of the depressed part; after which, the piece of wood being placed in water, either hot or cold, the parts previously depressed will rise to their former height, and will thus form an embossed pattern. This very ingenious mode of producing a device in relief may be available either in the rough form thus produced, or the embossment may itself be afterwards carved, and be made to receive any delicate touches which the taste of the artist may devise.

Ornamental devices are sometimes inlaid in wood by the Egyptians, in the following manner:—Various small trinkets have occasionally reached this country made of a dark brown coloured wood, and ornamented with brilliantly shining metallic figures, formed of circles and straight lines. On examining these specimens, it has been found that the surface of the wood is cut with narrow grooves to a small depth, in a manner corresponding with the device, and that these grooves are filled up with amalgam of mercury and tin in the crystallized state, analogous to that which results from the application of mercury and tinfoil to the back of looking-glasses, miscalled 'silvering.' The amalgam seems to retain a sufficient degree of consistency to remain in the grooves, and not to fall out easily. The brilliant metallic surface is rendered clear and bright whenever the surface of the wood is wiped.

The French have practised with considerable success the art of transferring to the surface of wood devices obtained from engraved prints; in fact, it may be said that the print itself is actually transferred, minus the paper, or the greater part of it. The chief features of the process are as follows:—

A flat and carefully prepared panel of sycamore, horse-chestnut, satin-wood, maple, or other kind of wood, constitutes the ground to which the transfer is made. When the surface has been planed smooth and even, it is coated with a layer of hot glue, which, when dry, is rubbed with glass-paper or Dutch rush, to remove the small filaments which the glue had raised, and to render the surface uniform. The surface is thus made ready for the reception of a coating of spirit varnish; and when this has dried, other coatings are successively applied, to the number of five or six, each one being thoroughly dried before the next one is applied.

The edges of the print are cut close to the engraving, and the print being laid face downwards on a flat table, the back is uniformly moistened with a wet sponge; any surplus water being afterwards removed by placing the print between two sheets of blotting-paper. While the paper is still moist, another layer of varnish is applied to the wood, and the print is laid down upon it, with the engraved side in contact with the varnished surface; the whole being carefully pressed and adjusted till it lies close to the surface, free from wrinkles or air-bubbles. A sheet of dry paper is laid on the print, and a linen cloth is passed over the surface, to press it firmly down. The whole is then left untouched until the varnish and the moisture are thoroughly dried, by which time the print will have become closely and firmly united to the surface of the wood. When dry, the back of the print is moistened with a wet sponge; and the fingers are rubbed lightly backwards and forwards over it repeatedly, till the paper comes off in small rolled fragments. This is a very delicate and curious part of the process; for if the whole of the paper were thus removed, the inked impression would be so likewise; but the varnish retains the front surface of the print with such tenacity, that a very thin film of paper may be left all over the surface, if the rubbing with the finger be delicately managed. When no more of the paper can be removed without injuring the print, it is allowed to dry: and when dry there is a thin film of paper still obscuring the inked impression from view; but this film has so little substance in it, that it almost wholly disappears on the application of a coat of varnish, and the print or impression presents itself as if on the surface of the wood. When quite dry, the surface is examined; and if any small parts of the engraving have been rubbed off or defaced, they are repaired by means of fine lamp-black and gum-water. Another coating of varnish is applied, and the surface is polished with Dutch rush steeped for three or four days in olive-oil. The oil is wiped off with a soft cloth, and any remaining portion is absorbed by a little powdered starch, carefully wiped off afterwards. Three or four layers of varnish are then applied, and the surface is lastly polished with a fine woollen cloth dipped in whiting or chalk.

It will be obvious on a little consideration, that the impression is by this method transferred in a reverse position, so that all objects which appeared at the right hand in the original print must appear at the left hand as received on the surface of the wood. By a modification and some complication of the process, means have been devised by a double transfer, effected on prepared drawing-paper, to give the impression in its natural position.



[Buenos Ayres]

BUENOS AYRES.

Englishmen are scarcely capable of judging fairly of the motives which have actuated the minds of the men who, for above thirty years, have been more or less constantly engaged in attempts to constitute states and establish forms of government in South America. A thousand years since, when the Heptarchy came to an end, we settled some of the questions which now give life to the struggles of the republics of the New World. Educated for centuries under constitutional forms of government, the English mind is intolerant of the folly or childishness of a nation which is in a state of political infancy; but if candidly regarded, there are many circumstances which should induce us to look with sympathy and indulgence upon the first efforts of the different States of South America to establish free institutions. The colonial government of Old Spain was perhaps one of the worst which has ever existed. Spain was incapable of fostering a generous love of free institutions, and the desire of wealth was the bond which attached her to her colonial offspring. She discouraged their industry in order that she might enjoy the fruits of a short-sighted monopoly; kept them in ignorance, the better to perpetuate her sordid dominion; excluded them from offices of trust and honour, and shut them out from every path which could develop their intelligence. The old viceroyalties stretched over regions so vast, that they comprised almost every clime, and when they were overthrown and the people began to form governments, the tentative process as to the territory which they were to comprise could scarcely be expected to succeed in the first instance. During the War of Independence the people in a whole viceroyalty might struggle cordially together, but when they had attained their object new interests developed themselves, and the necessity of re-casting the government arose. Experience could not be appealed to on these occasions; and time must therefore be given them before different interests can settle down into their true position.

The United Provinces of La Plata (the capital of which is Buenos Ayres) are more important to us in a commercial point of view than any of the republics of America which have thrown off the yoke of Spain. In 1842, and for some years previously, they took a larger quantity of our manufactures than Spain itself. In the above year the declared value of our exports to the Rio de la Plata was 969,791*l.*, exceeding those to Chili by nearly 20,000*l.*, and being one-third more than the exports to Peru. Until 1778 the merchants of Cadiz and Seville monopolized the whole of the trade of South America; but when this pernicious privilege was put an end to, Buenos Ayres, which had previously possessed only a contraband trade carried on from Peru through the river Plata, became one of the first trading cities in Spanish America. From 1792 to 1796 inclusive, the official valuation of the average imports was 586,580*l.*, and every article was sold at an exorbitant price: at the comparatively low prices of the present day they now exceed 1,500,000*l.* in value. The geographical position of these provinces will ensure to them a still greater commerce as this portion of the New World advances in prosperity and intelligence. The river Plata is the only river along a line of coast upwards of two thousand miles in extent from the Amazons, which affords the means of communicating with the countries comprised between the Andes and the mountainous districts which bound Brazil to the west. Portions of the independent states of Bolivia and Peru, as well as the provinces of the Rio de la Plata, are only accessible from the Atlantic by this river; and although Peru and Bolivia at present endeavour to force their trade from Europe by the circuitous route round Cape Horn, and to their provinces eastward of the Cordillera by an expensive conveyance by mules across sandy deserts and over mountain-passes, yet whenever the intermediate rivers shall be navigated by steam, for which they are admirably adapted, the trade of those vast countries will be much more easily supplied with all they want from Europe by inland water-carriage direct from Buenos Ayres. The trade of Buenos Ayres is therefore at

present confined to the people of her own provinces, whose number does not exceed 700,000. The provinces are thirteen in number, and comprise an area of 726,000 square miles, which is more than thirteen times the size of England and Wales. Each state is separated from its neighbour by extensive tracts of desert, or at least of uncultivated land. On the north, the republic is bounded by the state of Bolivia; on the west by Chili; on the east by Paraguay, the Banda Oriental, and the Atlantic Ocean; and on the south by the Indians of Patagonia. Each of the thirteen provinces is to a certain extent independent, but the provincial government of Buenos Ayres is invested with powers for national purposes and for carrying on the business of the Union with foreign states. The Legislative Assembly of this province consists of forty-four deputies, one half of whom are renewed annually by popular election.

So great is the influence of the river Plata, that the current of its turbid waters is felt at a distance of two hundred miles from its mouth. On entering the river its width is one hundred and seventy miles. After sailing up it nearly two hundred miles the voyager reaches the city of Buenos Ayres, or at least the anchorage off the city. If the vessel be a large one, it must anchor in the outer roads, seven or eight miles distant from the city, which is scarcely visible. The anchorage may be used by ships drawing fifteen or sixteen feet water. Foreign vessels do not go higher up the river, as Buenos Ayres is the only port of entry. Small vessels anchor in the inner roads, between which and the outer roads there is a sand-bank; but the anchorage here is one or two miles from the city. Here Buenos Ayres becomes visible in its full extent, ranging for about two miles along a slightly elevated ridge which bounds the river. There are neither mountains nor trees to break the monotonous outline, and beyond is one vast plain extending for nearly a thousand miles to the Cordillera of Chile. The actual landing is described by Sir Woodbine Parish as strikingly characteristic of the country:—"A ship's boat," he says, "has seldom water enough to run fairly on shore, and on arriving within forty or fifty yards of it, is beset by carts always on the watch for passengers. On the broad flat axle of a gigantic pair of wheels, seven or eight feet high, a sort of platform is fixed of half a dozen boards, two or three inches apart, letting in the wet at every splash of the water beneath. The ends are open; a rude hurdle forms the side; and a short strong pole from the axle completes the vehicle. To this unwieldy machine the horse is simply attached by a ring at the end of the pole, fastened to the girth or surcingle, round which his rider has the power of turning him as on a pivot, and of either drawing or pushing the machine along like a wheelbarrow, as may be momentarily most convenient." There was at one period a sort of mole, which partly obviated the inconveniences of landing, but it had been destroyed some years when Sir Woodbine Parish published his work. Considerable damage is done to goods by the present mode of carrying them on shore in these rude carts, and the evil might easily be corrected by a little energy.

The first thing which strikes the eye of a stranger in Buenos Ayres is the regularity of the streets, which are laid out on a plan prescribed for all the cities of Spanish America by the Council of the Indies. The streets intersect each other at right angles every one hundred and fifty yards, and rise with rather a steep ascent from the river. The white stuccoed houses look cheerful, and Sir Woodbine Parish remarks that the people have an independent contented air, which contrasted very favourably with the beggary and slave population he had just left at Rio de Janeiro. The Spaniards built a fort on the site of Buenos Ayres in 1535, but the warlike natives drove out the small garrison, and remained in undisturbed possession of that part of the country for nearly half a century; when, in 1580, the present city was founded, which for two centuries languished under the demoralising colonial system of the mother-country. In 1778, as already stated, the prohibitory and restrictive system of trade was relaxed; and the declaration of independence, although followed by many struggles, has laid the foundation of future prosperity. In 1778 the population of Buenos Ayres was 24,205, and that of the country jurisdiction immediately surrounding it was 12,025. At the close of 1825 the population of the two was estimated at 165,000, having doubled in the preceding twenty years; and in 1837 Sir Woodbine Parish was of opinion that it was not less than 200,000. The coloured population in 1825 amounted to nearly a fourth part of the population, but they have ceased to increase. The slave-trade was prohibited in 1813, and all traces of the negro race having existed will in a little time scarcely be apparent. The number of emigrants every year from Europe is very considerable; and in 1832 the number of foreigners who had fixed themselves in the city and province amounted to from 15,000 to 20,000; of whom two-thirds were British and French, in almost equal proportions; and the remainder consisted of Italians, Germans, and natives of the United States, especially from New York.

The churches of Buenos Ayres were nearly all erected by the Jesuits, and some of them are large buildings, but several are unfinished externally. There is an English church capable of containing a thousand persons, the ground for which was given by the government. There is also a Scotch Presbyterian chapel; and an Irish priest is allowed to do duty for the Irish portion of the community in one of the national churches. The public buildings are not deserving of particular notice. The fort or castle extends to the edge of the river, and is mounted with cannon, but it is of no use as a military defence, and is now appropriated to public offices and is the official residence of the president of the republic. The piazza, or grand square, is behind the castle, and is of considerable extent. It is divided into two parts by a long and low edifice, which serves as a kind of bazaar, and has a corridor along the whole length of each side, which serves as a shelter to the market-people. The space between this bazaar and the fort serves as a market for provisions and fruits, which are spread on the ground, no stalls being used. The cabildo, or town-house, an edifice of considerable size, occupies one side of the square, and is used as a court of justice, as well as by the municipal authorities. Near the centre of the great square a pyramid has been erected in commemoration of the revolution which terminated in the independence of the country. There are emblematic figures at each corner, representing Justice, Science, Liberty, and America, and the whole is enclosed with a railing.

In the neighbourhood of the grand square some of the houses have two stories, but generally speaking there is only a ground-floor: the apartments are built *en suite* without passages, round two or three successive quadrangular courts, called patios. A few years ago the floors of the best rooms were of brick, and the rafters of the roof were seldom hid by a ceiling. There were no chimneys, and the apartments were warmed with charcoal heated in a brasero, or brass pan. Before Sir Woodbine Parish left Buenos Ayres the fashions of old times were fast waning. English and French upholsterers had introduced furniture at once more convenient and in better taste; and the rooms were warmed by English coal brought as ballast from

Liverpool and sold at a cheaper rate than in London, and English grates had become common. Towards the street the houses have commonly two windows, which have seldom glass sashes, but are protected by iron railing, which, when painted green, and with festoons of flowering plants clinging round them, are less forbidding than might be supposed, and besides, in the heat of summer, the inhabitants can sleep with these windows open. Much remains to be done for the internal improvement of the city. There are no public cisterns, or reservoirs for water, which is an expensive article fifty yards from the river, and is carried about by itinerant watermen. Tanks are constructed by the wealthier inhabitants under their court-yards. The principal streets are tolerably paved with granite.

The trade and commerce of Buenos Ayres is the great source of employment to the population. The merchants engaged in the export and import trade are chiefly foreigners; but the produce of the country and retail business generally is in the hands of the natives. Mechanics and artisans from Europe, if they can keep steady, may become very prosperous. Education is making progress amongst the natives, and the number of institutions of a literary and scientific character in Buenos Ayres is very creditable to the intelligence of the government.

BOOK-CLUBS FOR ALL READERS.

One of the first attempts, and it was a successful one, to establish a cheap Book-Club was made by Robert Burns. He had founded a Society at Tarbolton, called the Bachelors' Club, which met monthly for the purposes of discussion and conversation. But this was a club without books: for the fines levied upon the members were spent in conviviality. Having changed his residence to Mauchline, a similar club was established there, but with one important alteration:—the fines were set apart for the purchase of books, and the first work bought was 'The Mirror,' by Henry Mackenzie. Dr. Currie, the biographer of Burns, in recording this fact, says, "With deference to the Conversation Society of Mauchline, it may be doubted whether the books which they purchased were of a kind best adapted to promote the interest and happiness of persons in this situation of life." The objection of Dr. Currie was founded upon his belief that works which cultivated "delicacy of taste" were unfitted for those who pursued manual occupations. He qualifies his objections, however, by the remark, that "Every human being is a proper judge of his own happiness, and within the path of innocence ought to be permitted to pursue it. Since it is the taste of the Scottish peasantry to give a preference to works of taste and of fancy, it may be presumed they find a superior gratification in the perusal of such works." This truth, timidly put by Dr. Currie, ought to be the foundation of every attempt to provide books for all readers. The great body of the people, if the best books are rendered accessible to them, will choose the best books. The very highest works of literature and art are addressed to the universal mind; those which aim at exclusiveness are the perishable productions which have their little day of drawing-room fame, and can never reach the greatest of all honour, that of making the labourer forget his toil in his free and equal converse with minds that shed their radiance indifferently over the cottage and the palace. We are learning to correct the false opinions which, for a century or two, have been degrading the national character by lowering the general taste. Those who maintained that taste was the exclusive property of the rich and the luxurious, could not take away from the humble the beauty of the rose or the fragrance of the violet; they could not make the nightingale sing a vulgar note to "the swink'd hedger at his supper;" nor, speaking purely to a question of taste, did they venture to lower the noble translation of the Bible, which they put into the hands of the poor man, to something which, according to the insolent formula of those days, was "adapted to the meanest capacity." A great deal of this has passed away. It has been discovered that music is a fitting thing to be cultivated by the people; the doors of galleries are thrown open for the people to gaze upon Raffaelles and Correggios; even cottages are built so as to satisfy a feeling of proportion, and to make their inmates aspire to something like decoration. All this is progress in the right direction. It remains to be seen whether, by a few strenuous efforts, books of real value—the best books in their universality—may not be made as accessible to the great body of the people as the best music, and be as much their property as flowers and sunshine.

In the year 1825, Lord Brougham (then Mr. Brougham), in his 'Practical Observations upon the Education of the People,' very clearly explained a plan which has yet been only partially acted upon, and cannot, indeed, have been fairly tested, for reasons which we shall presently explain. "Book-Clubs or Reading Societies may be established by very small numbers of contributors, and require an inconsiderable fund. If the associates live near one another, arrangements may be easily made for circulating the books, so that they may be in use every moment that any one can spare from his work. Here, too, the rich have an opportunity presented to them of promoting instruction without constant interference: the gift of a few books, as a beginning, will generally prove a sufficient encouragement to carry on the plan by weekly or monthly contributions: and with the gift, a scheme may be communicated to assist the contributors in arranging the plan of their association. I would here remark the great effect of combination upon such plans, in making the money of individuals go far. Three-halfpence a week, laid by in a whole family, will enable it to purchase in a year one of the cheap volumes of which I have spoken above; and a penny a week would be sufficient, were the publications made as cheap as possible. Now, let only a few neighbours join, say ten or twelve, and lend each other the books bought, and it is evident that, for a price so small as to be within the reach of the poorest labourer, all may have full as many books in the course of the year as it is possible for them to read, even supposing that the books bought by every one are not such as all the others desire to have." Simple in its working as such a plan would appear to be, the instances of these voluntary associations are really few. In Scotland Lending Libraries and Itinerating Libraries have, in some districts, been established successfully; but in England Lending Libraries are scarcely to be found except in connection with schools, or under the immediate direction of the minister of a parish or of a dissenting congregation.

The principle of voluntary association for the purchase of books has scarcely been called into action; and the reason is pretty obvious. The machinery by which such associations are worked is too cumbrous. We have before us the rules of a Reading Society in a village some ten miles from London. Here we have all the array of president, vice-president, secretary, honorary members, and subscribing members. There are quarterly meetings and annual meetings, balloting for new members, minutes, notices of motion—in a word, all the complex contrivances by which the management of such matters is kept in the hands of a directing few. But the great difficulty of all is the

choice of books; and this is a difficulty which cannot be get over without some new arrangements. If a collection of books were published at a sufficiently rapid rate, and at so low a price as very soon of themselves to be capable of being the foundation of a library—always provided that such books were unexceptionable in their morality, interesting as well as instructive, and containing an abundant provision of truly national literature—it is evident that all the troublesome arrangements of proposing books and of approving books, to say nothing of the difficulty of getting the best books sufficiently cheap, would be effectually got rid of. If a subscription of a penny a week by twelve individuals would place at their command fifty-two volumes in the course of a year, in which, from the nature of the subjects and their modes of treatment, the majority should feel an interest, it is evident that no machinery would be required to set such a plan in action but the association of twelve such individuals, and the choice of one amongst them as secretary, who would receive the subscriptions quarterly, purchase the books week by week as they came out, paste within their covers the rules of the Club, with a list of the names of the members in alphabetical or other order, and then send a volume to the first person on the list, who should keep it for a limited time, passing it on to the next, till it had been circulated through the whole number, and returned to the custody of the secretary. A few books of reference might be purchased by a small extra subscription, and deposited in some place of common access. The books might form a permanent library, or be sold amongst the subscribers at the end of each year.

To meet this principle of association in forming libraries amongst the great body of the people, Messrs. Knight and Co. have issued the plan of a publication to be entitled 'KNIGHT'S WEEKLY VOLUME FOR ALL READERS.' They say, "The friends of popular instruction—the people generally—feel that the rapidly growing appetite for information has not yet been adequately supplied. There is a demand for BOOKS of standard value and universal interest, cheap enough to find their way into every cottage, so trustworthy in their facts, sound in their principles, and attractive in their subjects and their treatment, as to be welcome to the most instructed readers. This demand has yet to be met. Miscellanies, such as the 'Penny Magazine' and 'Chambers's Journal,' have their own sphere of usefulness; science has been well taught in special treatises; series of works, such as the 'Family Library,' the 'Library of Entertaining Knowledge,' 'Lardner's Cyclopædia,' have still numerous readers; the 'Penny Cyclopædia' has shown how the cheapest book of reference might also be the best. We have many modern reprints of standard works, as cheap as we could desire; but they are mostly close-printed pamphlets, which are easily destroyed: their form unfits them for circulation from hand to hand. There is a general desire to form *Libraries for all Readers*—not only libraries of reference, but extensive libraries of circulation. In every case there is a difficulty in the choice of fitting books, whether we regard the subject matter or the form and price. It is hoped that the difficulty may be obviated by the publication of 'KNIGHT'S WEEKLY VOLUME.'

"1st. As to the subject matter:

"We propose to place within the reach of all readers a series of books which shall ultimately comprehend something like that range of literature which well-educated persons desire to have at their command. In this series there will be no attempt at exclusiveness. We shall not take up the most false and dangerous opinion that the understandings of the masses should be written down to, nor will mere didactic instruction be only attempted. A taste for knowledge is not so induced. The recreation of genial and amusing reading should be offered in connection with what is solid and serious. The publishers possess many valuable copyrights which may be readily adapted to this purpose. There is a great deal also to be done anew, in the way of judicious compilations, of translations from foreign works, and of original productions by authors of ability, conceived in a right spirit. We have many offers of assistance from writers of established reputation, who feel that the circulation of their thoughts in a cheap pocket volume is a tribute to their usefulness and their reputation. We have no want of materials to conduct this undertaking steadily and extensively.

"2nd. As to form and price:

"We propose to issue, every Saturday, a Volume, handsomely printed, of from 240 to 280 pages, containing as much matter as an ordinary octavo volume of 300 pages. Each volume will be essentially a book, not a tract—a book for the pocket and the library. Many of the volumes will be complete in themselves: some subjects will extend to two or more volumes. The price of each volume will be One Shilling, sewed, and Eighteenpence, bound.

"In proposing this series of unequalled cheapness and universality, we rely upon an extensive sale amongst the usual number of individual purchasers—a great body in these days. Some individuals will content themselves with selection; others will purchase the entire series. We also depend upon a large support from persons of wealth and influence, who are willing to render every aid in the formation of Lending Libraries. But we also see that *a new element of association* remains to be developed amongst the great body of the people; and we have especially adapted our plan to meet the formation of this medium of popular improvement, which requires only to be explained to be easily acted upon."

This plan, if adequately executed, cannot fail to be productive of much benefit

A few simple rules are necessary for the proper regulation of Book-Clubs for all Readers. The following are those of a "Cheap Lending Library," established in a country town in Ireland; and which have been promulgated in a very useful article on 'Country Lending Libraries,' in 'Chambers's Edinburgh Journal:'—

"1st. Subscriptions to be paid in advance at the time of subscribing, and at the commencement of every subsequent term.

"2nd. If a subscriber, through any cause whatever, detain a book or books beyond the time subscribed for, the subscription will continue open, and must be paid till the books are returned.

"3rd. If a book be written in, torn, or damaged, while in the possession of a subscriber, that book, or the set, if part of one, must be paid for at the cost price.

4th. If a subscriber lend a book to a non-subscriber, he forfeits his subscription; nor will a transfer of books from one subscriber to another be allowed.

"5th. For the general convenience and accommodation of subscribers, every work will be accompanied by a notice, limiting a reasonable time for reading it, to which the strictest attention must be paid.

"6th. If a book be not returned on the day appointed, the subscriber shall pay a fine of one penny for every day the book shall be detained; and if not returned within fourteen days after the day fixed for its return, application shall be made to the subscriber for the same; and if it be not then returned, the subscriber shall pay the value thereof, or of the set to which it belongs."



[St Anna.—From the collection in the Louvre.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXV.

Lionardo da Vinci (*concluded from p.* 171).

Vasari says that Lionardo was invited to the court of Milan for the Duke Lodovico's amusement, "as a musician and performer on the lyre, and as the greatest singer and *improvisatore* of his time;" but this is improbable. Lionardo, in his long letter to that prince, in which he recites his own qualifications for employment, dwells chiefly on his skill in engineering and fortification; and sums up his pretensions as an artist in these few brief words:—"I understand the different modes of sculpture in marble, bronze, and terra-cotta. In painting, also, I may esteem myself equal to any one, let him be who he may." Of his musical talents he makes no mention whatever, though undoubtedly these, as well as his other social accomplishments, his handsome person, his winning address, his wit and eloquence, recommended him to the notice of the prince, by whom he was greatly beloved, and in whose service he remained for about seventeen years. It is not necessary, nor would it be possible here, to give a particular account of all the works in which Lionardo was engaged for his patron,* nor of the great political events in which he was involved, more by his position than by his inclination; as the invasion of Italy, by Charles VIII. of France, and the subsequent invasion of Milan by Louis XII., which ended in the destruction of the Duke Lodovico. We shall only mention a few of the pictures he executed. One of these, the portrait of Lucrezia Crivelli, is now in the Louvre (No. 1091). Another was the Nativity of our Saviour, in the imperial collection at Vienna; but the greatest work of all, and by far the grandest picture which, up to that time, had been executed in Italy, was the Last Supper, painted on the wall of the refectory, or dining-room, of the Dominican convent of the Madonna delle Grazie. It occupied the painter about two years. Of this magnificent creation of art only the mouldering remains are now visible. It has been so often repaired, that every vestige of the original painting is annihilated; but from the multiplicity of descriptions, engravings, and copies that exist, no picture is more universally known and celebrated.

The moment selected by the painter is described in the 26th chapter of St. Matthew 21st and 22nd verses: "And as they did eat, he said, Verily, I say unto you, that one of you shall betray me: and they were exceeding sorrowful, and began every one of them to say unto him, Lord is it I?" The knowledge of character displayed in the heads of the different apostles was even more wonderful than the skilful arrangement of the figures and the amazing beauty of the workmanship. The best judgment we can now form of these merits is from the fine copy executed by one of Lionardo's best pupils, Marco Uggione, for the Certosa at Pavia, and now in London, in the collection of the Royal Academy. Eleven other copies, by various pupils of Lionardo, painted either during his life-time or within a few years after his death, while the picture was in perfection, exist in different churches and collections.

Of the grand equestrian statue of Francesco Sforza, Lionardo never finished more than the model, which was considered a master-piece. Some years afterwards, when Milan was invaded by the French, it was used as a target by the Gascon bowmen, and completely destroyed. The profound anatomical studies which Lionardo made for this work still exist. In the year 1500, the French being in possession of Milan, his patron Lodovico in captivity, and the affairs of the state in utter confusion, Lionardo returned to his native Florence, where he hoped to re-establish his broken fortunes, and to find employment. Here begins the third period of his artistic life, from 1500 to 1513, that is, from his forty-eighth to his sixtieth year. He found the Mc-

* Of these the canal of the Martesana, as well from its utility as from the difficulties he surmounted in its execution, would have been sufficient to immortalize him.

dici family in exile, but was received by Pietro Soderini (who governed the city as "*Gonfaloniere perpetuo*") with great distinction, and a pension was assigned to him as painter in the service of the republic.

Then began the rivalry between Lionardo and Michael Angelo, which lasted during the remainder of Lionardo's life. The difference of age, for Michael Angelo was twenty-two years younger, ought to have prevented all unseemly jealousy: but Michael Angelo was haughty and impatient of all superiority, or even equality; Lionardo, sensitive, capricious, and naturally disinclined to admit the pretensions of a rival, to whom he could say, and *did* say, "I was famous before you were born!" With all their admiration of each other's genius, their mutual frailties prevented any real good-will on either side. The two painters competed for the honour of painting in fresco one side of the great Council-hall in the Palazzo Vecchio at Florence. Each prepared his cartoon; each, emulous of the fame and conscious of the abilities of his rival, threw all his best powers into his work. Lionardo chose for his subject the Defeat of the Milanese general Niccolò Piccinino by the Florentine army in 1440. One of the finest groups represented a combat of cavalry disputing the possession of a standard. "It was so wonderfully executed, that the horses themselves seemed animated by the same fury as their riders; nor is it possible to describe the variety of attitudes, the splendour of the dresses and armour of the warriors, nor the incredible skill displayed in the forms and actions of the horses."

Michael Angelo chose for his subject the moment before the same battle, when a party of Florentine soldiers bathing in the Arno are surprised by the sound of the trumpet calling them to arms. Of this cartoon we shall have more to say in treating of his life. The preference was given to Lionardo da Vinci: But, as Vasari relates, he spent so much time in trying experiments, and in preparing the wall to receive oil-painting, which he preferred to fresco, that in the interval some changes in the government intervened, and the design was abandoned. The two cartoons remained for several years open to the public, and artists flocked from every part of Italy to study them. Subsequently they were cut up into separate parts, dispersed, and lost. It is curious that of Michael Angelo's composition only one small copy exists; of Lionardo's, not one. From a fragment which existed in his time, Rubens made a fine drawing, which was engraved by Edelinck, and is known as the "Battle of the Standard."

It was a reproach against Lionardo, in his own time and since, that he began many things and finished few; that his magnificent designs and projects, whether in art or mechanics, were seldom completed. This may be a subject of regret, but it is unjust to make it a reproach. It was in the nature of the man. The grasp of his mind was so nearly superhuman, that he never, in anything he effected, satisfied *himself* or realized his own vast conceptions. The most exquisitely finished of his works, those that in the perfection of the execution have excited the wonder and despair of succeeding artists, were put aside by him as unfinished sketches. Most of the pictures now attributed to him were wholly or in part painted by his scholars and imitators from his cartoons. One of the most famous of these was designed for the altar-piece of the church of the convent called the "Nunziata." It represented the Virgin Mary seated in the lap of her mother St. Anna, having in her arms the infant Christ, while St. John is playing with a lamb at their feet; St. Anna, looking on with a tender smile, rejoices in her divine offspring; the figures were drawn with such skill, and the various expressions proper to each conveyed with such inimitable truth and grace, that when exhibited in a chamber of the convent, the inhabitants of the city flocked to see it, and for two days the streets were crowded with people, "as if it had been some solemn festival;" but the picture was never painted, and the monks of the Nunziata, after waiting long and in vain for their altar-piece, were obliged to employ other artists. The cartoon, or a very fine repetition of it, is now in the possession of our Royal Academy, and it must not be confounded with the St. Anna in the Louvre, a more fantastic and apparently an earlier composition. (See the Illustrative Wood-cut.)

Lionardo, during his stay at Florence, painted the portrait of Ginevra Benci, already mentioned, in the memoir of Ghirlandajo, as the beauty of her time; and also the portrait of Mona Lisa del Giocondo, sometimes called La Joconde. On this last picture he worked at intervals for four years, but was still unsatisfied. It was purchased by Francis I. for four thousand golden crowns, and is now in the Louvre. We find Lionardo also engaged by Cæsar Borgia to visit and report on the fortifications of his territories, and in this office he was employed for two years. In 1514 he was invited to Rome by Leo X., but more in his character of philosopher, mechanic, and alchemist, than as a painter. Here he found Raphael at the height of his fame, and then engaged in his greatest works—the frescoes of the Vatican. Two pictures which Lionardo painted while at Rome—the Madonna of St. Onofrio, and the Holy Family, painted for Filiberta of Savoy, the pope's sister-in-law (which is now at St. Petersburg)—show that even this veteran in art felt the irresistible influence of the genius of his young rival. They are both *Raffuellesque* in the subject and treatment.

It appears that Lionardo was ill-satisfied with his sojourn at Rome. He had long been accustomed to hold the first rank as an artist wherever he resided; whereas at Rome he found himself only one among those who, if they acknowledged his greatness, affected to consider his day as past. He was conscious that many of the improvements in the arts which were now brought into use, and which enabled the painters of the day to produce such extraordinary effects, were invented or introduced by himself. If he could no longer assert that measureless superiority over all others which he had done in his younger days, it was because he himself had opened to them new paths to excellence. The arrival of his old competitor Michael Angelo, and some slight on the part of Leo X., who was annoyed by his speculative and dilatory habits in executing the works intrusted to him, all added to his irritation and disgust. He left Rome, and set out for Pavia, where the French king Francis I. then held his court. He was received by the young monarch with every mark of respect, loaded with favours, and a pension of 700 gold crowns settled on him for life. At the famous conference between Francis I. and Leo X. at Bologna, Lionardo attended his new patron, and was of essential service to him on that occasion. In the following year, 1516, he returned with Francis I. to France, and was attached to the French court as principal painter. It appears, however, that during his residence in France he did not paint a single picture. His health had begun to decline from the time he left Italy; and feeling his end approach, he prepared himself for it by religious meditation, by acts of charity, and by a most conscientious distribution by will of all his worldly possessions to his relatives and friends. At length, after protracted suffering, this great and most extraordinary man died at Cloux, near Amboise, on the 2nd of May, 1519, being then in his sixty-

seventh year. It is to be regretted that we cannot wholly credit the beautiful story of his dying in the arms of Francis I., who, as it is said, had come to visit him on his deathbed. It would indeed have been, as Fuseli expressed it, "an honour to the king, by which Destiny would have atoned to that monarch for his future disaster at Pavia," had the incident really happened, as it has been so often related by biographers, celebrated by poets, and represented with a just pride by painters, and willingly believed by all the world; but the well-authenticated fact that the court was *on that day* at St. Germain-en-Laye, whence the royal ordinances are dated, renders the story at least very doubtful.

We have mentioned a few of the genuine works of Lionardo da Vinci; they are exceedingly rare. It appears certain that not one-third of the pictures attributed to him and bearing his name were the production of his own hand, though they were the creation of his mind, for he generally furnished the cartoons or designs from which his pupils executed pictures of various degrees of excellence.

Thus the admirable picture in our National Gallery of Christ disputing with the Doctors, though undoubtedly designed by Lionardo, is supposed by some to be executed by his best scholar, Bernardino Luini; by others it is attributed to Francesco Melzi.

Of nine pictures in the Louvre attributed to Lionardo, three only—the St. John, and the two famous portraits of the Mona Lisa and Lucrezia Crivelli—are considered genuine. The others are from his designs and from his school.

In the Florentine gallery, the Medusa is certainly genuine; the famous Herodias, probably painted from his cartoon by Luini. His own portrait, in the same gallery (in the Salle des Peintres), is wonderfully fine—the finest of all, and the one which at once attracts and fixes attention.

In the Milan collections are many pictures attributed to him.

But it is the MS. notes and designs left behind him that give us the best idea of the indefatigable industry of this "myriad-minded man," and the almost incredible extent of his acquirements. In the Ambrosian Library at Milan there are twelve huge volumes of his works relative to arts, chemistry, mathematics, &c.; one of them contains a collection of anatomical drawings, which the celebrated anatomist Dr. Hunter described as the most wonderful things of the kind for accuracy and beauty that he had ever beheld. In the Royal Library at Windsor there are three volumes of MSS. and drawings, containing a vast variety of subjects—portraits, heads, groups, and single figures; fine anatomical studies of horses; a battle of elephants, full of spirit; drawings in optics, hydraulics, and perspective; plans of military machines; maps and surveys of rivers; beautiful and accurate drawings of plants and rocks, to be introduced into his pictures; musical airs noted in his own hand, perhaps his own compositions; anatomical subjects, with elaborate notes and explanations. In the Royal Library at Paris there is a volume of philosophical treatises, from which extracts have been published by Venturi. In the Holkham Collection is a MS. treatise on hydraulics. The 'Treatise on Painting,' by Lionardo da Vinci, has been translated from the original Italian into French, English, and German, and is the foundation of all that has since been written on the subject, whether relating to the theory or to the practice of the art. His MSS. are particularly difficult to read or decipher, as he had a habit of writing from right to left, instead of from left to right. What was his reason for this singularity has not been explained.

The scholars of Lionardo da Vinci, and those artists formed in the Academy which he founded in Milan, under the patronage of Ludovico il Moro, comprise that school of art known as the Milanese or Lombard School. They are distinguished by a lengthy and graceful style of drawing, a particular amenity and sweetness of expression (which in the inferior painters degenerated into affectation and a sort of vapid smile), and particularly by the transparent lights and shadows—the *chiaroscuro*, of which Lionardo was the inventor or discoverer. The most eminent painters were Bernardino Luini, Marco Uggione, or D'Oggioni, Antonio Beltraffio, Francesco Melzi, and Andrea Salai. All these studied under the immediate tuition of Lionardo, and painted most of the pictures ascribed to him. Gaudenzio Ferrari and Cesare da Sesto imitated him, and owed their celebrity to his influence.

PICTURES AND DEVICES IN STRAW.

Among the substances employed for producing embossed and variegated pictures or ornaments, *straw* some years back occupied a place. In England this substance is very little used for manufactures, except to be plaited for bonnets; but the smooth, hard, glossy, and elastic surface of the material has often recommended it for ornamental purposes, though the small size of the pieces procurable has been a bar to its general use. Before the disruption of the French monastic establishments at the time of the Revolution, the inmates in many cases employed themselves in the fabrication of embossed straw ornaments. One of the Chartreuse brethren at a later period gave a full description of the process, in the 'Dictionnaire Technologique,' and as it is probably little known in this country, we will give the chief features in a condensed form.

The straw selected for this object was such as presented the whitest, the thinnest, the longest, and the largest barrel or straw; all these qualities being more or less necessary. When the straws were removed within doors, they were severed above and below all the knots, by means of a pair of scissors: and the knots, the enveloping membrane, and the upper or smaller part of the stem, being removed as useless, the remainder were carefully preserved for use. When the selected pieces were six or eight inches in length, about the thickness of a goose-quill, free from any stains or spots, and very thin in substance, they were deemed the best fitted for the object contemplated.

The next process was to bleach the straws. Such of the straws as were to receive certain particular colours were then split open, while others were not split until after they were dyed. This splitting was different from that which occurs in the straw-plait manufacture; for in the latter, if the plait is not made of 'whole straws,' it consisted of straws cut into two or four strips each; whereas in the former the straw was opened from end to end, and laid out flat at its full width; so that if a straw were about a sixth of an inch in diameter, it was opened and spread out to a flat riband about half an inch wide. Originally this process of opening the straws was effected in a very tedious manner. If the straws were split while dry, they would rend and crush in every direction; and care was therefore taken to moisten them previously; they were placed on a paved yard during the night, whereby they absorbed moisture sufficient to make them open readily. The artificer took up each straw singly, held it in his left hand, introduced into the tube at one end a wooden spindle, and by a slight pressure and dexterous movement made a straight rent all along the tube from end to end. He then opened the straw, laid it down flat on a smooth piece of apple-tree wood, and rubbed it briskly with a kind of burnisher, till it lay quite flat

on the wood. He then took another straw, and treated it in a similar manner. This very tedious process was afterwards superseded by the use of a flatting-mill, consisting of two cylinders revolving close together, and having a kind of spindle projecting in front of them. The man held the straw in his left hand, and turned the cylinders with his right. He thrust the end of the straw upon the spindle, which had a sharp cutting edge; and the shape of the spindle was such as to gradually open the straw as it was advanced, so that the straw was enabled to enter between the rollers in a flattened state, which state was rendered permanent by the great pressure of the upper roller on the lower. The straws were thus rent, opened, and flattened by one movement, and the process was carried on with much rapidity.

Next ensued the process of dyeing the straws. For this purpose various substances were employed. The straws were sometimes boiled in the liquid, and in other instances merely steeped; and either opened or whole or unopened.

The straws, thus opened and dyed, were next pasted on pieces of paper so as to form sheets of straw. About twenty straws were laid side by side, to form one sheet; and the utmost care was taken in the production of an uniform sheet by such means. In the first place the straws of any particular colour were compared, with a view to the selection of such as should correspond in tint even to the minutest shade. The straws were laid down one by one on a very smooth board of apple-tree wood; a straight rule was laid on the straw, and a sharp lancet or small knife was drawn along from end to end, so as to give a straight and uniform edge to the straw. The other edge was cut or trimmed in a similar manner, so that the straw was brought to a very exact form. The paper was then coated with a layer of flour-paste, and the straw laid upon it in regular order, side by side, so as to leave no interstices between them. The straws were rubbed over with a soft cloth to remove the superfluous paste, and to keep them down in their places. A common screw-press was at hand for the purpose of pressing the straws down upon the paper. This press was provided with a dozen small boards of walnut-wood, about one-sixth of an inch in thickness: and between each two of these was placed several sheets of paper. The pasted straw-sheet was placed between two of these sheets of paper, and lightly acted on by the press. Another sheet of straw was similarly prepared, placed between two other boards, and pressed in a similar manner. The first straw-sheet was removed, placed between dry sheets of paper, and pressed again. The process thus continued until a great number of sheets of straw were prepared, and all were pressed so that the straws should adhere permanently to the thin pieces of paper to which they had been pasted.

Sheets of straw were thus prepared, of many different colours, each a few inches square, and all perfectly flat, smooth, and equable in appearance. From these sheets the ornamental productions were made, in two or three different ways, which we will briefly describe.

The first consisted in a kind of mosaic-work, in which small fragments of straw were arranged in a diversified order as to colour, and according to some fanciful device. There was a kind of ornament called *bergames*, after a species of ancient tapestry, which was much in favour among these specimens of straw-work. A straight-edged ruler, a sharp lancet or penknife, and a small pair of compasses, or else a gauge, comprised the chief tools employed. With these tools the sheets of straw were cut up into very narrow strips all regular and straight at the edges, and varying generally from an eighth of an inch to a twenty-fifth of an inch in width. These tiny filaments were pasted carefully on a sheet of thin paper in such order as taste suggested. Sometimes there was one narrow strip intervening among wider ones; or the colours repeated themselves in regular series. When these were pasted, they were subjected to the action of a press; and when dry, they were ready for another modification of arrangement. Each sheet was cut up into very narrow strips, at right angles to the former; and these were repasted on a third piece of paper in such a way that some of the colours should depart from the straight line somewhat in the manner that a '*fault*' deranges the direction of a vein in a mineral stratification. This, in fact, constituted the peculiarity of the *bergame* pattern; and it is not difficult to see that such patterns might be varied without end.

Another and more complicated kind of work was thus effected. The design to be worked was drawn with pen and ink on paper. As it was a coloured picture that was to be produced, as many sheets of straw were taken as there were to be colours, one of each colour, and these were laid down flat on a board, one upon another. The paper design was laid on the top, and the whole were secured from shifting or disturbance. The whole thickness of straw and paper was then cut through by very small and delicately managed cutting tools, so as to follow the lines of the design, and cut all the sheets of straw into numerous small pieces, according to the complexity of the design.

Then ensued the tedious part of the process. The paper pattern, now cut to little fragments, was removed, and under this were the sheets of straw, also cut to fragments, but all cut just in the same manner. These fragments were removed one by one with a little pointed instrument, and arranged in their proper order on a board. We will suppose that there had been four sheets of straw, red, yellow, green, and purple: each of these had been cut similarly; and the object next was to produce four variegated pictures or designs. The little pieces were now repasted side by side on a piece of paper in their proper order as to form, but varied as to colour; so that out of four sheets, each of one colour, there might be made four designs, each in four colours. The same part of the device which was of one particular colour in one specimen, was of a different colour in a second specimen.

A further step in the art was to give an embossment or relief to the pictures thus made. For this purpose moulds formed of horn were employed, with counter-moulds formed of many thicknesses of pasteboard. The devices in or on one of these moulds corresponded with that represented by the different colours of the straw picture: indeed the latter was taken from the former. The straw picture, when formed, was carefully adjusted between the mould and the counter-mould, and subjected to such a pressure as would gradually bring it to fall into the device of the mould, the straw-side being placed in contact with the mould, so as to be in relief when taken from it. All the raised and depressed parts of the device corresponded in a determinate way with the different colours of the picture.

The straw pictures thus produced were sometimes chased or engraved, and were in some few instances worked up to represent cameos. The minute details need hardly be given here, for it was only proposed to give a general idea of the mode of proceeding. The operation is evidently one fitted only for those with whom time has but little value. Still it is ingenious, and involves a few arrangements worthy of notice.



[Luton Church]

RAMBLES FROM RAILWAYS.

The Lea.—No. I.



CARCELY another river of the like extent and size could be found to yield to the bookish perambulator so abundant a harvest of associations as the Lea. Few could surpass it in the objects and places of interest that are to be found in proximity to its banks: and if it affords not many very striking features of landscape scenery, it presents several of extreme loveliness: such as made one, who has described many of them with a delightful zest, think "as he sat on a primrose bank and looked down the meadows—that they were too pleasant to look on but only on holidays," and then "turn his present thoughts into verse;" in a wish, he adds, "I'll repeat to you:—

> "I in these flow'ry meads would be,
> These crystal streams should solace me," &c.

As we ramble along the banks of the Lea we shall be able just to glance at the more noticeable places as we successively reach them: some few we shall speak of at length, but the most part we shall content ourselves with merely pointing out.

The river Lea rises at Houghton Regis, about a mile and a half north-east of Dunstable in Bedfordshire, and entering Hertfordshire near Hide Mill, proceeds in a south-easterly direction through Wheathampstead and Hatfield Park, soon after leaving which it inclines to the north-east, and passes by Hertford and Ware, whence it bends again to the south, and is joined by the Stort near Hoddesdon; from which place it divides the counties of Hertfordshire and Essex, till it leaves the former at Waltham Abbey: it then separates Essex from Middlesex, continuing to flow nearly south, till it enters the Thames at Blackwall, opposite Greenwich marshes. By means of cuttings it has been rendered navigable for barges as far as Hertford; but it was a much larger river than it now is, before Alfred diverted its waters in order to lay the Danish fleet aground.

The source of the Lea cannot be readily reached from a railway. The nearest station is at Leighton, on the Birmingham line, from whence it is about eight miles across a fine country. Perhaps a still pleasanter way, though somewhat longer, is to leave the railway at Tring, and mounting the hills above Aldbury to go across Ashridge Park (a place worth looking at), and by Little Gaddesden and Dagnall to Dunstable. Over these hills the pedestrian will be accompanied by the music of thousands of larks, and in return for their melody, he may, if he please, when he reaches Dunstable, regale his palate with a dish of them. A lark, as cooked at the principal inns in that town, is said to form a most delicious morsel. But we only speak by report, for although it is a main principle with us in travelling to taste whatever the place we are in is famous for—so that we reckon it a misfortune that, led astray by the advice of a dietist, we did not touch brawn when at Canterbury, and we can remember no similar omission—and though we should have little sympathy for even a tee-totaller who should abstain from a mouthful of "Glenlivat o' the sma' still," in rambling over the Highlands, or in crossing the moors—we confess we could not bring ourselves to order a dish of the little aërial warblers, whose harmony we had just been listening to with so greedy an ear. The visitor should not pass through Dunstable without looking at its really magnificent church—only a portion however of the ancient conventual church—with its rich Norman doorway and windows—whose elaborate carvings are unfortunately much defaced, though still retaining much beauty; and he should, if he can, obtain a sight of the fine font in the interior.

From Dunstable, a walk of little more than a mile across the fields brings us to Houghton Regis, where, as we have said, the Lea rises. There is nothing remarkable in its source; the water, as at the source of many rivers, spreads out into a sort of pond, and there is little in it, or in the scenery about it to claim atten-

tion. The village of Houghton Regis is one that may deserve some regard; the scenery is of a cheerful rural character in itself, and scattered about it are many clusters of picturesque cottages, with goodly thatched roofs covered with deep coloured mosses, and enlivened with many a noisy group of rosy children about their doors. The church too is a fine old building—somewhat *improved* by modern taste—but a fine building still; and in it is an ancient monument, with the effigies of a knight in armour, under a rich Gothic arch, which will well repay the attention of the antiquary. On the arch is a coat of arms, 'a chevron between three butterflies,' which, according to Lysons, are those of the Sewells, an ancient family who possessed the manor of Sewell, mentioned in Domesday book. Houghton Regis, as its name implies, was anciently a part of the royal demesne: it now belongs to the Duke of Bedford, by one of whose ancestors it was purchased, with the manor of Sewell, in 1750. We have given, in our initial letter, a sketch of the Lea near its source, the church of Houghton Regis is in the back-ground.

It would be idle to follow our stream yet awhile, step by step. For some distance from its source it is only a sort of ditch, and skirts ploughed fields: and though it flows past a village or two, we do not remember anything worth noticing till it reaches Luton. Before it arrives at Luton it has, however, swelled into a brook of fair size, and sometimes lays the neighbouring marshes under water—indeed throughout its course its banks are for the most part marshy and liable to be flooded. Luton lies low, and has at times suffered severely from inundations. Its name is derived from the river which was "in British *Luh*." (Morant.) It is a neat, clean town, and from the number of straw-hat and other factories, has much of that business-like air the city-dweller so much misses in most second-rate country towns in agricultural districts. 'De Waagen was much struck with its appearance:—"The little town of Luton," he says, "is very pleasantly situated in a rather hilly country. What a difference between that and places of a like extent in Germany! In the principal streets there is a good flag pavement, such as but few of the largest towns of Germany can boast." Luton has few buildings of interest: the church is almost the only one. This is of large size and unusual beauty. It is of Gothic architecture, but of various periods; the chancel was built by John Whethamsted, abbot of St. Albans, in the fifteenth century, and is deserving inspection. There is an air of grandeur about the whole building; but it is to be regretted that its venerable character has been greatly injured by modern barbarians—worse than Goths—who have covered the whole body of the church with a thick coating of lime-wash. The tower, which is built of stone and flints in alternate squares, is the only part that has escaped the tasteless infliction: and its time-worn aspect appears to frown more darkly upon the sickly hue of its appendages. Unfortunately the evil is not confined to a distaff survey; the details of the architecture are almost hidden by the vile wash: and what is perhaps most provoking is, that it has only been perpetrated within a few years, when we might have expected that a better feeling would have prevailed.* The interior of the church contains several interesting monuments. At the west end of the nave is an elegant Gothic baptistery of an octagonal form, which is described more at length, and figured in Lysons's 'Magna Britannia,' Bedfordshire, p. 31. On the south side of the chancel are four richly-carved stone seats. Other objects of interest, which we have not time now to notice, will repay examination.

The making of straw plait is quite a feature in the villages as well as in the towns round about this neighbourhood. In fine weather, as the women and girls sit or stand about the cottage-doors, plaiting the straw in the sunshine, by the porches gay with bright flowers, they present groups such as our painters might delight to seize and embody. We wonder that they have not oftener been transferred to canvas: pourtrayed in true and characteristic form and colour, they would, we think, yield hardly, if at all, in rustic grace and piquancy to the often-painted distaff spinners.

After passing by Luton the Lea flows through Luton Park, which is extensive and well wooded. The park was laid out by Browne, who appears in this case to have accomplished his task with much skill. In it are two large lakes, said to contain, the one fourteen, and the other forty acres, supplied by our river. Luton Hoo, as the house was called, was purchased by the celebrated Earl Bute in 1762, who immediately commenced enlarging and rebuilding it on a scale of extreme grandeur. He employed Robert Adam as his architect, who was at the same time engaged in the erection of Shelburne House, in London, for him; but the public clamour caused the latter to be given up, and the works at Luton to be suspended for a time, and when these were afterwards completed, it was on a less extensive plan. This fine mansion was unfortunately almost destroyed by fire on the 9th of November, 1843, only the right wing having been saved, and unfortunately many of the pictures also, with other valuable property, were burnt, or damaged by their hasty removal. The interior was of unusual splendour. Dr. Johnson visited Luton Hoo along with Boswell, and although there were some things he did not admire, "on the whole," says Boswell, "he was very much pleased; he said, 'This is one of the places I do not regret having come to see. It is a very stately place indeed; in the house magnificence is not sacrificed to convenience, nor convenience to magnificence. The library is very splendid, the dignity of the rooms is very great, and the quantity of the pictures is beyond expectation, beyond hope.'" This we think a piece of criticism eminently characteristic of the doctor. His admiration of the *quantity* of the pictures, "beyond expectation, beyond hope," is particularly good.* Nor is his remark about the pleasure-grounds inferior in its way; every one knows with what indifference he regarded natural scenery; and would easily guess how impatiently he would listen to the accounts given him of these grounds; "but when it was proposed to walk in them," Boswell tells us he replied, "Don't let us fatigue ourselves. *Why should we walk there?* Here's a tree, let us get to the top of it." As Dr. Johnson said, the quantity of the pictures is beyond expectation, and there are many very good ones among them. Earl Bute had excellent opportunities of procuring good works from both Italy and Holland, and he fully availed himself of his opportunities.

After it quits Luton park the Lea runs close alongside the Whethamsted road till it reaches that place. The scenery is in many parts pretty, but very little varied, and the banks are low. Two or three water-mills are worked by it, but, like nearly all the mills on the Lea, they are not very attractive in their appear-

* We lately visited an old church in Hertfordshire, where a similar enrichment has been effected in the interim, and the names of those who caused it to be "whitewashed and beautified" are, very properly, inscribed in large letters over the entrance to the chancel. Why is not a like memorial placed on the outside of Luton church? The churchwardens should look to it—taste so refined should not be suffered to pass unhonoured and unknown.

* Dr. Johnson, in his 'Life of Milton,' speaks as if "to count pictures," as he there terms it, were the only object in looking at a collection of them.

ance. Whethamsted is a cheerful little town. The church is rather a curious structure, something in the form of a Maltese cross, with a tower and somewhat dumpy spire, rising from the intersection of the nave and transept. It was at Whethamsted that the barons who confederated against Edward II. and his favourite Pierce Gaveston assembled their forces. From Whethamsted the scenery is more picturesque. The traveller may make his way along the meadows by the river side without much difficulty, yet it is hardly worth his while; the road, which is rather a pleasant one, leaves the river a little on the left, and following it for about two miles, we reach Brocket Hall and park, the seat of Lord Melbourne. Brocket Hall was erected about a century since by James Pane, who has given elevations and plans of it, and of the bridge he here built across the Lea, in his work entitled 'Views, Plans, &c.' The house is a brick edifice, of a somewhat striking appearance, and the Lea spreads out before it into a spacious lake. Altogether it is well fitted to afford a refreshing retreat from the care and strife of political contests.

We notice nothing worth mentioning from the time the river leaves Brocket Park until it enters Hatfield Park, although the rambler will not regret pursuing its course. The meadows abound with flowers, and the river offers in its windings frequent pictures, a little Dutch in their character but more beautiful than Dutch master, though he be Cuyp himself, ever painted.

The Lea runs through a corner of Hatfield Park, leaving Hatfield considerably on our right. There is nought in the town to call us out of the way. Hatfield Park is of vast extent, and though rather level is considerably diversified in its aspect by the profusion of noble trees it contains. In it are said to be some of the finest oak, elm, and ash trees in the county. At a corner of one of the avenues on the northern side of the park is an old oak, called the *Queen's Oak*, from a tradition that when Elizabeth was a prisoner here, it formed the boundary of her daily walks. It is much decayed, only one of its main branches remaining; but the decayed part has been carefully covered with a cement, and a railing has been placed around it to preserve it from curious visitors. Hatfield House is the property of the Marquis of Salisbury, and is of enormous size. One of its wings, it will be remembered, was destroyed by fire a few years back, when the dowager marchioness was burnt to death. The part then destroyed has been rebuilt, and we believe large alterations have been made in various parts of the mansion by the present marquis, who has an inclination for building. The place possesses much historical interest: Elizabeth, as we have said, was a prisoner here; after her accession to the throne she gave Hatfield House to Lord Burleigh, the ancestor of the present Marquis of Salisbury. Charles I. was also for a short time confined in it. The interior of the mansion is said to be very splendid, and it contains a good many excellent pictures; but it is to be regretted that the public are strictly excluded from seeing them, or from inspecting the building.*

[To be continued.]

THE USE OF LEMON-JUICE IN THE NAVY.

There is not, perhaps, among the remedies employed for grievous maladies, one more remarkable for its uniform efficacy than that of lemon-juice or lime-juice for the scurvy, which was once such a dreadful scourge to the English navy. It has so completely eradicated the disease, or at least places the disease so completely under control where simple precautions are taken, that the consequent change in the general health of the navy has been most signally important.

Any one who has read the narrative of Lord Anson's voyage must remember the sufferings to which the poor seamen were exposed by the attacks of this disease, at a time when the use of the proper remedy was not well known. It has been shown by the physicians of the navy, that of the predisposing causes to this disease the chief are—a cold dampness in the atmosphere; a scarcity of pure water, a kind of food defective in its nutritious qualities, such as meat rendered dry and hard by the process of salting as usually adopted to preserve it for sea-use: and a scarcity or privation of succulent vegetables in their green state. These two latter causes are very likely to occur out at sea, and hence the disease has been prone to make its appearance. In all the instances where the disease has proved serious, these privations have been more or less experienced. When one of the armies of the Crusaders was in Palestine, under Louis IX., the men had only one kind of fish, no meat (because it was the season of Lent), bad air, and scarcity of water; and these causes together gave rise to a serious attack of the disease. When Vasco de Gama doubled the Cape of Good Hope in his way towards India, his crew were dreadfully attacked by the disease: and the narratives of later navigators, such as Drake, Davis, Cavendish, and Dampier, contain similar details. Sir Richard Hawkins, in the account of his voyage to the South Seas in 1593, says that within his naval experience he had known ten thousand men to have perished by its ravages. In the case of Lord Anson's crew, where four-fifths of the men were carried off by the complaint, there were many unfavourable circumstances; the weather was very tempestuous, the wind was cold and cutting; the crew had been long without any fresh food, and the water was bad. In the narrative, after describing the scenery of the island of Juan Fernandez, the writer observes:—"Such a scene, so beautifully diversified, must have been delightful to an indifferent spectator; but in the distressed condition of the Centurion's men, who were in a manner languishing for the land and its vegetable productions (a situation of mind which always attends the scurvy), it is not to be conceived with what transport and eagerness they viewed the shore, and how impatiently they longed for the greens, the fresh water, and the other refreshments then in sight." He further observes:—"Those only who have endured a long series of thirst, and can readily recall the desire and agitation which the ideas alone of springs and brooks have at that time raised in them, can judge of the emotion with which they (the crew) eyed a large cascade of the most transparent water, which poured itself from a rock near one hundred feet high into the sea at a small distance from the ship. Those who had long been confined to their hammocks now exerted all the strength they had left in crawling up to the deck to feast their eyes with the reviving prospect. Thus they coasted along the shore, contemplating the enchanting landscape, which improved as they advanced; but the night closed upon them before they had discovered a proper bay. At four the next morning the third lieutenant was despatched with the cutter to discover the bay they sought for, and at noon he returned with the boat laden with seals and grass; for the boat's crew did not stay to search for better vegetables, as they well knew that even grass would prove a dainty, and indeed it was soon eagerly devoured."

Cleanliness and dryness of the ship, cleanliness of person, moderate occupation, cheerfulness, good water, fresh provisions—all contribute in various means to the prevention of this disease; but the use of lemon-juice

* An engraving of Hatfield House is given in the 'Penny Magazine' for January, 1843 (No. 692, p. 12).

or lime-juice is the most signal antidote. It was towards the latter end of the last century that naval commanders adopted the use of this valuable agent in such a way as to demonstrate clearly its value; but the use of it was more or less known long before. Oranges, lemons, limes, and shaddocks, are four kinds of fruit closely allied in botanical character; and all have been found valuable as specifics for this disease,—especially lemons and limes,—partly, as is supposed, on account of the citric acid which they contain. As early as 1564 some Dutch sailors, returning from Spain with a cargo of lemons and oranges, found great relief from the attacks of the scurvy by the use of these fruits. In 1593 Sir Richard Hawkins experienced the value of lemon-juice as an antiscorbutic in his ships. In a work on Naval Surgery, published in 1636, after the disease has been described, the best remedy is thus spoken of:—"The use of the juice of lemons is a precious medicine, and well tried; being sound and good, let it have the chief place, for it will deserve it; the use whereof is: It is to be taken each morning, two or three spoonfuls, and fast after it two hours; and if you add one spoonful of aqua vitæ thereto to a cold stomach, it is the better." In two works published in 1683 and 1694, advice is given that citron and lemon juice should be provided for the seamen on long voyages. Yet, notwithstanding the knowledge thus possessed in various quarters concerning the value of this medicinal agent, so little was the subject generally understood, that Lord Anson set out on his circumnavigation in 1740 without any prevention or remedy for the dreaded disease; but, on arriving at an island where oranges and lemons grew in great plenty, upwards of a hundred sick men were put on shore, and the greater part of them recovered after eating plentifully of the fruit.

Even after the experience gained by Lord Anson, a period of half a century was allowed to elapse before the remedy became so far established as to lead to the regular supply of lemon-juice to British ships of war. Captain Cook had not with him so large a supply as to render its general use practicable; but he adopted numerous subsidiary precautions, which have ever since been recognized as valuable. He kept all his men employed, but not too laboriously; he caused their hammocks and bedding to be aired on the decks every dry day; he thoroughly dried the ship by placing stoves in various places between decks; he had an awning over the deck to shade the crew from a tropical sun; he provided clothes of different kinds to suit different climates; he was solicitous always to provide abundance of fresh water; and he took out with him a large supply of sour krout (a kind of pickled cabbage), of which every man had three or four pounds per week. So judicious were all these arrangements that in a voyage of three years and eighteen days, his crew entirely escaped from the disease. The sour krout ('saures kraut,' literally 'sour cabbage'), above alluded to, is prepared by slicing the soundest and most solid cabbages in the way cucumbers are used in this country. In this state they are put into a barrel in layers, and over each layer is strewed a handful of salt and caraway seeds. In this manner it is rammed down, layer upon layer, till the barrel is full; when a cover is put over it, and it is pressed down with a heavy weight. After standing for some time in this state, it begins to ferment; and when the fermentation has entirely subsided, the head is fitted on, and the barrel finally shut up till ready for use.

Vinegar, spruce, infusion of malt, solution of nitre, and other substances have been found more or less efficacious; but lemon-juice has eclipsed them all. Sir John Barrow, in the article 'Navy' in the 'Encyclopædia Britannica,' says:—"The first general supply of lemon-juice to the navy was established in the year 1795, in consequence of a trial which had been made of it the preceding year in the Suffolk, of seventy-four guns. This ship left England, and arrived at Madras in September, without touching at any land. With every man's grog there were daily mixed two-thirds of a liquid ounce of lemon-juice, and two ounces of sugar. She lost not a man; and though the disease made its appearance in a few, an increased dose of lemon-juice immediately removed it. Thus the Suffolk, after a voyage of one hundred and sixty-two days, arrived without losing a man, or having a man sick of the scurvy; whereas the Centurion, in one hundred and forty-three days from the last place of her refreshment, lost half of her crew, whilst the other half were so feeble and emaciated as to be utterly helpless. Nothing could more strongly point out the efficacy of lemon-juice than the following fact. When Lord St. Vincent commanded the fleet which blockaded Brest from the 27th May to the 26th September, 1800, he maintained so close a blockade, that not a single day passed without reconnoitring the entrance of the harbour; yet, although the seamen of his fleet, consisting of at least sixteen thousand men, had no other than the ordinary ship's provisions, sixteen only, in the course of four months, were sent to the hospital."

Sir Gilbert Blane, the late director of the medical department in the navy, was instrumental in the introduction of the use of lemon-juice in the navy in 1795: and he lived to describe its effects thirty-five years afterwards. Dr. Kerr, in the 'Cyclopædia of Practical Medicine,' says that "Usually, after ships have been a fortnight at sea, to every individual in them a fluid ounce of lemon-juice mixed with an ounce and a half of sugar, is served out daily, which, with the addition of water and of wine or spirits, affords a grateful beverage, the use of which is enforced when the neglect of it is suspected, or under particular apprehension of the invasion of the disease. It is in consequence of this prophylactic (prevention from disease), Sir Gilbert Blane infers, that there are now many surgeons in the navy of long standing who have never seen a case of the disease; and, as appears from an inspection of a great number of journals, that it has either not appeared at all, or else in so slight a degree that it was speedily checked by an increase of the quantity of the antidote. No other remedy yet known can ward off, he observes, this dreadful scourge of mariners under the use of salt provisions for an indefinite length of time." Sir Gilbert Blane even stated, that no other remedy applied to any other disease with which he was acquainted, is so invariable and certain as that of lime-juice in the particular disease to which seamen are so liable.

It has been stated that fresh oranges and lemons, in a partially ripe state, are better than the juice previously prepared, as the latter is somewhat liable to spoil. To check this tendency to spoil, Captain Bagnold communicated to the Society of Arts some years ago a description of a method adopted by him. He caused the expressed juice to be well strained, to separate every particle of pulp and rind; and it was then boiled in an earthen vessel for half an hour. When part of the water was driven off by this boiling, the vegetable albumen separated, and subsided on cooling. The juice was next decanted, and reboiled for a few minutes. It was then put into bottles previously dried and heated, so as to leave just room enough for the cork; the cork was driven down and cemented over, and the bottle left in that state. Some of the juice thus bottled was tasted six months, and another sample eighteen months, after the bottling, and was said to have suffered very little change.



[The Flight of the Bear.]

HUDIBRAS.—No. V.

After the character of the champion, that of the Bear himself is given:

"He was by birth, some authors write,
A Russian, some a Muscovite:
And 'mong the Cossacks had been bred,
Of whom we in diurnals read,
That serve to fill up pages here,
As with their bodies ditches there.
Scrimansky was his cousin-german,
With whom he serv'd, and fed on vermin
And when these fail'd, he'd suck his claws,
And quarter himself upon his paws."

This will seem as familiar to those who remember the Russian campaigns of the present century, as to those who recurred to the contests between Peter the Great and Charles XII. of Sweden. Nor will it be more difficult to make application of the following lines from the description of Talgol, "mortal foe to cows:"

"Nor engine, nor device polemick,
Disease, nor doctor epidemic,
Tho' stor'd with deletery med'cines,
(Which whosoever took is dead since)
E'er sent so vast a colony
To both the under worlds as he.
For he was of that noble trade,
That demi-gods and heroes made,
Slaughter and knocking on the head;
The trade to which they all were bred;
And is, like others, glorious when
'Tis great and large, but base if mean.
The former rides in triumph for it;
The latter in a two-wheel'd chariot,
For daring to profane a thing
So sacred, with vile bungling."

Magnano, the tinker, is said by Dr. Grey to have been one Simon Wait, but as the poem says—

"In magic he was deeply read
As he that made the brazen head," &c.

it is more probable that a fortune-telling gipsy is meant. His companion also, Trulla, partakes of that character:—

"Thro' thick and thin she follow'd him,
In ev'ry adventure h' undertook,
And never him or it forsook;
At breach of wall, or hedge surprise,
She shar'd i' th' hazard and the prize.
At beating quarters up, or forage,
Behav'd herself with matchless courage,
And laid about in fight more busily,
Than the Amazonian dame Penthesile."

"The upright Cerdon," the cobbler, the repairer of wrongs, is the next personage, and much of his portraiture consists of a humorous description of his trade, and that seems to lead, by a species of association, to the attributing to him somewhat of a sectarian character, by mingling it with the conceits applicable to his trade. As a cobbler,

"Fast friend he was to reformation,
Until 'twas worn quite out of fashion.
Next rectifier of wry law,
And would make three to cure one flaw.
Learned he was, and could take note,
Transcribe, collect, translate, and quote.
But preaching was his chiefest talent,
Or argument, in which being valiant,
He used to lay about, and stickle
Like ram or bull, at conventicle:
For disputants, like rams and bulls,
Do fight with arms that spring from skulls.

It will be seen how readily the verbal play on the technical terms leads to the addition of his preaching. We believe there are many Cerdons yet existing in many places besides conventicles.

"Last Colon came, bold man of war,
Destin'd to blows by fatal star;
Right expert in command of horse,
But cruel, and without remorse.
That which of Centaur long ago
Was said, and has been wrested to
Some other knights, was true of this,
He and his horse were of a piece.
One spirit did inform them both,
The self-same vigour, fury, wroth;
Yet he was much the rougher part,
And always had the harder heart:"

too true and too common a description of the cruelty

arising from the mere possession of animal vigour with the absence of all consideration in uneducated men who have control over animals.

These were the leaders—

"From foreign parishes, and regions,
Of different manners, speech, religions,
Came men and mastiffs."

And to these "men and mastiffs" Hudibras is made to address a speech remonstrating against their proceedings, as derogatory to the cause in which he assumes they as well as himself were engaged. It is too long to extract, and does not admit of abridging. Talgol replies to him in a violent attack on the parliamentary party, by no means likely to proceed from one who had fought for it; a few lines will show its character—

"Could thine impertinence find out
No work t' employ itself about,
Where thou secure from wooden blow,
Thy busy vanity mightst show?
Was no dispute a-foot between
The caterwauling brethren?
No subtle question rais'd among
Those out-o'-their wits, and those i'th' wrong;
No prize between those combatants
O'th' times, the land and water saints;
Where thou mightst stickle without hazard
Of outrage to thy hide and mazzard;
And not for want of bus'ness come
To us to be thus troublesome,
To interrupt our better sort
Of disputants, and spoil our sport?
Was there no felony, no bawd,
Cut-purse, nor burglary abroad?
No stolen pig, nor plunder'd goose,
To tie thee up from breaking loose?
No ale unlicens'd, broken hedge,
For which thou statute mightst allege,
To keep thee busy from foul evil,
And shame due to thee from the Devil?
Did no committee sit, where he
Might cut out journey-work for thee?
And set th' a task, with subornation,
To stitch up sale and sequestration,
To cheat, with holiness and zeal,
All parties and the common-weal?
Much better had it been for thee,
H' had kept thee where th' art us'd to be;
Or sent th' on bus'ness any whither,
So he had never brought thee hither."

A humorous relation of the affray succeeds, in which—

"With many a stiff thwack, many a bang,
Hard crab-tree and old iron rang;"

until the squire is dismounted by his steed, who has had a bunch of thistles placed under his tail: and the knight by Talgol, who heaves him over by lifting the "nearer foot:"

"But Mars, that still protects the stout,
In pudding-time came to his aid,
And under him the bear convey'd;
The bear, upon whose soft fur gown
The knight with all his weight fell down."

The bear, affrighted, breaks loose, and quickly disperses those who could use their legs;

"In haste he fled, and so did they,
Each and his fear a several way."

But Hudibras was lying "in a swound," and the fiddler, whose wooden leg had been broken, commenced using the fragment upon the fallen knight, when Ralpho, recovering from his fall—

"Wing'd with speed and fury, flew
To rescue knight from black and blue;"

succeeds in subduing the unfortunate cripple, and then devotes his care to his master:—

"To rouse him from lethargic dump
He tweak'd his nose; with gentle thump
Knock'd on his breast, as if 't had been
To raise the spirits lodg'd within.
They, waken'd with the noise, did fly
From inward room to window eye,
And, gently op'ning lid, the casement,
Look'd out, but yet with some amazement."

The pair then debate the fate of Crowdero. The knight is for slaying him outright, but the squire urges—

"Great conq'rors greater glory gain
By foes in triumph led, than slain:
The laurels that adorn their brows
Are pull'd from living, not dead boughs,
And living foes: the greatest fame
Of cripple slain can be but lame.
One half of him 's already slain,
The other is not worth your pain;
Th' honour can but on one side light
As worship did when y' were dubb'd knight.
Wherefore I think it better far,
To keep him prisoner of war:"

and he is thereupon conveyed with all convenient speed to "the wooden bastile"—the parish stocks—

"By strange enchantment made to fetter
The lesser parts, and free the greater;
For tho' the body may creep through,
The hands in grate are fast enough.
And when a circle 'bout the wrist
Is made by beadle exorcist,
The body feels the spur and switch,
As if 'twere ridden post by witch
At twenty miles an hour pace,
And yet ne'er stirs out of the place.
On top of this there is a spire,
On which Sir Knight first bids the Squire,
The fiddle, and its spoils, the case,
In manner of a trophy, place;
That done, they ope the trap-door gate,
And let Crowdero down thereat.
Crowdero making doleful face;
Like hermit poor in pensive place,
To dungeon they the wretch commit,
And the survivor of his feet:
But th' other that had broke the peace,
And head of knighthood, they release,
Tho' a delinquent false and forg'd,
Yet being a stranger he 's enlarg'd;
While his comrade, that did no hurt,
'S clapp'd up fast in prison for 't.
So Justice, while she winks at crimes,
Stumbles on innocence sometimes."

ENCROACHMENTS OF THE LAND ON THE SEA.

There are causes constantly but silently in operation, whereby land, more or less fitted for agricultural purposes, is gained or reclaimed from the sea, so that the surface of the country becomes permanently enlarged. There are, on the other hand, sources of change whereby the sea absorbs or covers portions which were before dry land; and it may happen that in some countries the balance between these two forces is favourable to the country, while in others it may be unfavourable. However, the former sources of change are those to which we will here allude.

It is mostly at some spot where a river empties itself into a lake, an inland sea, or the ocean, that these reclamations of land occur; and the land is in such cases formed of finely divided mud and sand. In many cases these spots obtain the name of *deltas*, derived from the Greek name for the letter *d*, to the triangular form of which (Δ) their shape often bears some resemblance. The Lake of Geneva presents a striking illustration of the gradual formation of such a district.

This lake is about forty miles long, and from two to eight broad; and the river Rhone enters it at the eastern end. The waters of the river are turbid and discoloured where they enter the lake; but when they leave it at the western end, near Geneva, they are beautifully clear and transparent. From this it follows that the sediment which the river brings down with it into the lake is deposited before the current reaches Geneva; and it is equally plain that this process must gradually fill up the lake. There was an ancient town called Port Vallais, once situated at the water's edge near the eastern end, which is now a mile and a half inland; the intervening tract of land having been acquired, in the course of about eight centuries, by the subsiding and consolidation of the solid matters brought down by the river. There is a flat or alluvial district about five or six miles in length, composed of sand and mud, and raised a little above the surface of the water. This is situated where was once deep water; and an examination of the neighbouring district, by Sir Henry de la Beche, has shown that other portions of similar alluvial land are in process of formation. It has, in fact, been pretty well proved that the deposited mud occupies a slightly inclined plane on the bed of the lake, extending two miles in length, and reaching in thickness up to the surface of the water at the eastern extremity. As the deposition goes on, so will this mud become more and more elevated beyond the reach of the water, so as to form a delta. In short, many geologists are prepared to believe that the whole lake may in time be filled up by this cause alone, and that a rich agricultural soil may be formed on the site of the present lake. In how many thousands of years this might occur no one can say; but it is believed that the deposited mud of the river is capable of producing such a result.

In the Baltic, districts of available land are gradually being acquired where sea has hitherto flowed. It is near the head of the gulf of Bothnia, in this lake, that the acquired land is mostly seen; and this is supposed to result from two causes—the influx of sediment from numerous rivers, as at the lake of Geneva, and a slow and general upward movement of the land itself and of the bed of the sea, at the rate of several feet in a century.

At the spot where the Rhone empties itself into the Mediterranean, an alluvial deposit, or delta, is gradually forming. The Rhone, after leaving the lake of Geneva, receives so much earthy and stony matter from the Alpine districts through which it flows, that when it reaches the Mediterranean it discolours the blue waters of the sea with a whitish sediment to a distance of six or seven miles sea-ward. The delta here formed has been continually increasing in extent. Mese, a small island described by some of the early writers, is now far inland, a delta of alluvial deposit having connected it with the main land. A spot which was a harbour about eight centuries ago is now a league inland. Psalmodi was an island about the same period, and is now two leagues inland. A tower which was erected on the shore so recently as 1737, is now a mile inland. As the same causes are constantly in operation, there will be a gradual acquisition of new land near the mouth of the Rhone, which will probably be applied to some useful purpose as it solidifies.

The northern end of the Adriatic Sea, where the river Po enters it, is silently exhibiting indications of the same effects. For a distance of a hundred miles in length a band of alluvial land has been formed, varying from two to twenty miles in breadth; and there is evidence to show that this formation has been the work of the various rivers during a period of two thousand years. Adria, which was a seaport in the time of Augustus, and which gave a name to the gulf itself, is now twenty miles inland. Ravenna was a seaport, and is now four miles inland. Spina, a very ancient city built on the sea-shore, was so far back as the eleventh century eleven miles inland. In the time of the Romans the hot-baths of Monfalcone were on one of several islands of Alpine limestone, between which and the mainland, on the north, was a channel of the sea about a mile in breadth; whereas this channel is now converted into a grassy plain, which surrounds the islands on all sides. It is believed that the Adriatic was once very deep near the northern end; but it is now so shallow that new portions of dry land will gradually be formed, from the filling up of the bed by river deposits.

So much has been written concerning the delta of the river Nile, that almost every reader is acquainted with the general character of the country near its banks and mouth. More than two thousand years ago it was a common expression in that country that "Egypt was the gift of the Nile." The mud which is deposited after the overflowing of the river forms, in fact, the surface of the "land of Egypt;" for the elevated spots beyond the reach of the river are limited in extent. It is supposed that the sea once washed the base of the rocks on which the pyramids of Memphis stand, and that all the country now intervening between the two has been formed by alluvial deposits. The entire bed of the Nile is becoming coated with a thick layer of this deposit, and thereby gradually raised.

The delta of the Ganges is one of the most vast and wonderful on the surface of the globe. The head or northern extremity of this delta is no less than two hundred miles from the present line of the coast, or, in other words, two hundred miles of land in breadth have been robbed from the sea. Its base is also about the same distance; so that if we imagine a triangle, measuring somewhat more than two hundred miles on each of its three sides, we shall get a rude approximation to the size and form of the district of land reclaimed near the mouth of the Ganges. The whole of this is not solid land; for there are many mouths by which the mighty river empties itself into the sea; and the part of the delta which borders on the sea is a dreary wilderness known as the Sunderbunds, infested by tigers and alligators, and intersected by small rivers and creeks. So vast is the quantity of mud and sand brought down by the Ganges from the Himalaya and the interior country, that the sea does not recover its transparency at a less distance than sixty miles from the shore. Large islands are formed in the Ganges in the course of a few years. Some of these, many miles in length, have originated in large sandbanks thrown up round the points at the angular turning of the river, and afterwards insulated by breaches of the stream. Others, formed in the main channel, are caused by some obstruction at the bottom: a large tree or a sunken boat is sometimes sufficient to check the current, and cause a deposit of sand, which accumulates till it usurps a considerable portion of the channel. Islands as large and as fertile as the Isle of Wight have thus been formed.

At the mouth of the Mississippi there are two long tongues of land gradually forming, jutting out to a considerable distance into the sea. These are the prolongations of the banks of the river, and arise from the subsidence of the matter brought down by the waters, and spread around at the time of the inundation. The part of the Gulf of Mexico near the mouth of the Mississippi is becoming shallower and shallower, by the settlement of the immense mass of solid material brought down from the interior: and there can be no doubt that the quantity of dry land will gradually increase in that region.

Very few persons have an adequate conception of

the vast quantity of earthy matter brought down by rivers; and therefore the formation of new islands, and portions of dry land, by the subsidence of such materials, may seem surprising. Mr. Darwin computed, from observations which he made, that the Yellow River in China brings down two million cubic feet of earthy matter every hour. The Rev. Mr. Everest has computed that the Ganges, in one hundred and twenty-two days of the rainy season, carried down six thousand million cubic feet of earthy matter; and Mr. Lyell, in commenting on this extraordinary result, says:—"In order to give some idea of the magnitude of this result, we will assume that the specific gravity of the dried mud is only one-half that of granite (it would, however, be more): in that case the earthy matter discharged in a year would equal 3,124,088,720 cubic feet of granite. Now about twelve and a half cubic feet of granite weigh one ton; and it is computed that the great pyramid of Egypt, if it were a solid mass of granite, would weigh about 6,000,000 tons. The mass of matter therefore carried down annually, would, according to this estimate, more than equal in weight and bulk forty-two of the great pyramids of Egypt." As a further means of conveying to the mind an idea of the enormous quantity of solid matter brought down by the Ganges, Mr. Lyell states that if a fleet of eighty Indiamen, each freighted with fourteen hundred tons of mud, were to sail down the river every hour of every day and night for four months continually, they would only transport from the higher country to the sea a mass of solid matter equal to that borne down by the Ganges in the four months of the flood season; or, in other words, a fleet of two thousand such ships going down daily with the same burden, and discharging it into the Gulf, would be no more than equivalent to the operation of the great river. We need not wonder, then, at the formation of new land by such a vast mass of earthy matter.

Our own island is not without indications of similar phenomena going on. Not many weeks ago a paper was read before the Institute of Civil Engineers, bearing on this point. It was thus briefly noticed in the 'Athenæum':—"A description was read 'Of the formation of the Cownland of Musselburgh on the Frith of Forth,' by Mr. James Hay. This was a curious instance of an extensive tract of nearly four hundred acres of land being formed by an alluvial deposit in about three hundred years. The river Esk, when swollen by rains, is stated to bring down quantities of the detritus from the hills, which, with the soil washed from the banks of the lowlands, is arrested when it meets the tide, and is thrown upon the beach. This, being mixed with large boulder-stones, becomes fixed, and the sand is blown over it by the heavy north-winds to which the shore is exposed. Thus this large tract has been formed. The diagram exhibited showed the several lines of high water at various dates, and that nearly the entire town has been built upon land thus recovered from the sea, without the aid of art."

On the eastern coast of England, especially about Norfolk, tracts of sandy land have been formed where before was to be seen only sea. But these have in most cases been formed by a different agency from that which has hitherto engaged our notice. These sandy tracts have been mostly produced by tides and currents, which carry the loose sand from the bed of the German ocean across the mouths of rivers and æstuaries. These encroachments of the land on the sea are therefore hurtful rather than beneficial; but there is a peculiar inlet of the sea, called the *Wash*, which is of a different character. The Wash is the æstuary of the rivers Nene and Welland, and its bed is occupied for the most part by sand-banks, dry at low water. Between the mouths of the two rivers, the coast is so low as to require the protection of a sea-wall or bank; and it has more than once been proposed so to manage this embankment as to enclose a considerable portion of the Wash, and render it convertible to useful purposes. Mr. Lyell, in the sixth edition of his 'Geology,' says:—"It has been lately proposed by Sir John Rennie and others to rescue from the dominion of the sea a large part of what is called the 'Wash,' between the counties of Lincoln and Norfolk. The plan for accomplishing this object consists in deepening and straightening the channels of the rivers Ouse, Nene, Witham and Welland, all of which are to be confined between well-formed banks, and united into one grand channel in the centre of the Wash. The land already gained by similar operations since the middle of the seventeenth century is of vast extent, and the additional space which the projectors hope to reclaim on the opposite shores of Lincoln and Norfolk will amount to a hundred and fifty thousand acres, and be half as large again as the county of Rutland in area."

Some years ago a gentleman named Harriot, living in Essex, purchased for a trifling sum a small island which had been of no use to any one. It was situated near Great Wakering, and contained two hundred and sixteen acres of land, which was covered by the sea every flood tide, but left dry at the ebb. His object was to try to bring this little island into cultivation; and for this purpose he began to enclose it with a bank of earth thirty feet wide at bottom, seven feet high, and four feet wide at top, with an external 'battis' or slope of two feet horizontal for one foot perpendicular. The wall encircled the island, and was about two miles and a half in circuit, having in it only one gap about seventy feet wide, through which the tide flowed in and out. At length attempts were made to close this gap. Earth was at first used; but the sea broke away this earth as fast as it was thrown in. Piles were then driven in in a double row, and clay rammed in between them. This succeeded, and the little island was gradually drained. For the first two years it was too unsound and wet to become of much value, but afterwards it became cultivable. Rape-seed, mustard, and oats were first sown, but the land contained at first too much salt to be fitted for wheat. A house, a barn and a stable were built on the reclaimed island, and inhabited by a few farm-labourers. It was many years ago that a description of this undertaking was given in the 'Transactions of the Society of Arts,' and that Mr. Harriot had a gold medal awarded to him for his ingenuity.

Cudbear.—This valuable article is the *Lecanora tartarea* of Acharius. It is common in Derbyshire on limestone, and incrusts most of the stones at Urswic Mere. It is gathered for the dyers by peasants, who sell it for a penny a pound; they can collect 20 or 30 pounds a day. It gives a purple colour. The same rock is not scraped oftener than once in five years. It is prepared for use with volatile alkali and alum, by the manufacturers in Glasgow; and, when sold to the dyers, it appears in the form of a purple powder, called Cudbear. Much is imported from Norway. Dr. Hooker states that in the neighbourhood of Fort Augustus, 1807, by collecting this lichen with an iron hook, a person could earn 14*s.* per week, selling the article at 3*s.* 4*d.* the stone of 22 lbs. The fructified specimens are the best. Pennant also records it as an article of commerce about Taymouth; and Miss Roberts informs us that it is collected in North Wales at three half-pence per pound, for the London market. Several lichens, possessing somewhat of the same quality, would appear to have occasioned some confusion in the application of the terms orcele, argol, orchal, cooker, or corcar.—*Notes of a Naturalist.*



[1, Antiqua; 2, Ziczac; 3, Cossus; 4, Russula; 5, Jacobæ; 6, Ocs; 7, Parthenias.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

British Moths—*continued.*

From the Sphinxes we may pass on to the Moths, constituting the genus Phalæna of Linnæus, but divided by modern naturalists into many distinct families and multitudinous genera. To enter into an analysis of the several families, or to define the genera, is not our present purpose; we aim merely at a representation of such species as may interest the general reader from their beauty or their habits, and at the same time convey an idea of the extent of variation of form which obtains among them. He who would become conversant with entomology must devote himself to the study of it; and, even then, so extensive is the domain that few cultivate more than some one portion of it, and content themselves with a general survey of the rest. To those, however, who have not time to follow out the science, and whose duties lead them to pursuits far removed from any department of zoology, sketches of the animals of our own country in particular often prove very acceptable. Let us, then, now turn to the group before us.

1. The Vapourer moth (Orgyia antiqua), Perfect Insect, Caterpillar, and Pupa and Wingless Female. This species is very diurnal in its habits; it is far from uncommon in our island, and is, indeed, abundant in the neighbourhood of London, occurring even in the streets. Its flight is short, jerking, vacillating, and interrupted; it rests with extended anterior legs and elevated antennæ. The wings are ferruginous; the anterior are clouded with brown, with two undulated and almost obsolete streaks; a pale yellow crescent-shaped spot on the disc, and a snow-white sublunate spot at the lower angle: the hinder wings are unspotted. The female is of a dark cinereous tint, destitute of wings, with serrated antennæ. She is often seen surrounded by crowds of suitors.

The caterpillar, as is the case with those of the genus Orgyia, is thickly covered with fascicles of hair. It is of a dusky colour, spotted with red, with a black

patch on the back; two dark whisker-like tufts of hairs spring from the head; two similar tufts are placed on each side of the body, and one rises from the tail; besides these, there are tufts of long radiating hairs along the sides. The food of the caterpillar consists of the leaves of various trees, especially of the white and black thorn, and is to be found from April to August, when it changes to a dusky yellow pupa. The perfect insect is found from July to October.

2. The Pebble Prominent (Notodonta Ziczac), Perfect Insect, Caterpillar and Pupa. The Pebble Prominent is by no means one of our common moths, nor is it very generally distributed. It has been occasionally taken in the neighbourhood of London, at Darent and Combe Woods, and is said to be rather frequent at Holt, Norfolk. According to Mr. Vigors, it has been found near Dublin. In the male the anterior wings are pale chestnut, brown at the base, with two abbreviated streaks on the anterior margin, between which is a large subquadrate whitish patch, followed posteriorly by a larger ocelliform one, tinged with purplish, intersected by black dashes on the nervures, margined anteriorly by a deep brown lunule, and posteriorly by greyish clouds and a whitish streak; hinder margin with a narrow black line: posterior wings ash-coloured, with a central lunular dusky spot, and a narrow marginal line. The female has the anterior wings of a more uniform chestnut tinge, and the hinder wings mouse-coloured.

The caterpillar has two acute protuberances on its back, and one on the last segment. It is greenish, or ash-coloured, with a pale lateral stripe, and a reddish tail. It feeds on the poplar and willow, and in September assumes the pupa state. The perfect insect first appears in May; but from this month to July there is a gradual accession of individuals, though not in great numbers.

3. The Goat moth (Cossus Ligniperda), Perfect Insect, Caterpillar and Pupa. In many parts of our island this fine moth is by no means uncommon. It is found from June to the end of July, infesting oaks, willows, poplars, aspens, &c., upon the wood of which the caterpillar feeds, working its way through the solid substance of the tree, and consequently proving highly destructive, the more especially as it is three years before it assumes the pupa state.

The perfect insect measures from two inches ten lines to upwards of three inches, or in the female to three inches six or nine lines, in expanse of wings. The anterior pair are clouded with greyish and brown, with numerous transverse irregular black streaks and reticulations. The posterior wings are dusky, with obscure reticulated streaks towards the hinder margin. This moth is not very active, at least during the day, and may be observed reposing amidst the foliage of the trees, which it habitually frequents.

The caterpillar emits a most disgusting odour; it attains to a huge size, and is of a dull rufescent colour, with large shining red patches on the back, and two triangular black spots behind the head, which latter is black. Before it changes to a pupa state, which is generally in the autumn, the caterpillar searches for a convenient place, and then shrouds itself in a case composed of pieces of wood, which it unites together by means of a strong glutinous substance, lining the whole with silk. The pupa is brown, and strongly denticulated on the margin of each segment.

4. The Clouded Buff moth (Euthemonia Russula, Stephens), Perfect Insect, Caterpillar and Pupa.

The Clouded Buff moth measures about an inch and a half in the expanse of its wings. It is a common insect on heaths and commons; in the New Forest it is abundant, and is in considerable plenty on Stockton Heath and in the neighbourhood of York, and, according to the Rev. L. Jenyns, is not uncommon in Bottisham and Horningsea fens. The male generally flies in the afternoon, and may be observed during the day resting on furze-bushes, and the rough shrubs of the common, but the female is seldom to be seen, as she generally conceals herself at the roots of plants or bushes, amidst dense vegetation. She is moreover far more sluggish in her habits than the male, numbers of the latter being often noticed active on the wing around her resting-place.

In the male the chest and anterior wings are pale yellow, the anterior margin near the apex, the inner margin, and long basal hairs bright sanguineous; posterior wings and abdomen yellowish white, the former with a dusky lunate spot on the disc, and a marginal fringe of the same colour. Shaft of the antennæ and legs rufescent. In the female the antennæ, head, thorax, and anterior wings are reddish or fulvo-rufous, the margins of the latter, the nervures and central lunule, bright sanguineous. The posterior wings are fulvous; with the base, an ovate spot near the centre, and the margin dull black.

The caterpillar is of a dusky tint, with yellow spots along the sides, and dull orange hair closely set in fascicles. Various grasses, plantain, hound's-tongue, &c. constitute its food. It changes in May to a reddish brown pupa, shrouded in a web upon the ground. The perfect insect appears in June.

5. The Pink Underwing (Callomorpha Jacobææ), Perfect Insect, Caterpillar and Pupa.

This beautiful moth is extremely abundant in certain localities. It is common around London, but we have observed it in multitudes in the neighbourhood of Herne Bay, and on the hills around Dover. It is said to be common in Cambridgeshire and in Devonshire; it is numerous in Epping forest, and also in Darent-wood. This moth is partially diurnal in its habits, and in favourite spots great numbers are often seen together, flitting about or resting on the stems of the ragwort. The head, body, and limbs are black; the anterior wings ashy brown, with a longitudinal streak of scarlet parallel to the anterior margin, and two roundish spots of the same colour on the external margin. The hinder wings are bright sanguineous on both surfaces, with a posterior narrow fringe of ashy brown.

The caterpillar is slightly hairy, and alternately ringed with black and yellow; it feeds upon the flowers of the ragwort, and spins a loose cocoon on the stems of the plant, within which it assumes its pupa state, the perfect insect emerging the following May. The caterpillar of this species is to a certain extent gregarious, numbers infesting the same plant, and weaving their respective cocoons on its stems.

6. The Double-O moth (Cymatophora Oo), Perfect Insect, Caterpillar and Pupa.

This moth is local in its distribution, being rare in some places and tolerably abundant in others; it is by no means common in the immediate vicinity of London, but, according to Stephens, has been taken rather plentifully near Chigwell Row, in Epping forest, and at Darent-wood. He adds that he has taken it on Clandon Common, and that it has been found in other neighbouring places. It is stated to occur at Leatherhead in Surrey, and to have been found near York, on the oak. It is nocturnal in its habits.

The head and thorax are of a pale ochre yellow, sprinkled with dusky; the anterior wings are pale yellow, with a pale ferruginous mark near the base, and finely reticulated with the same colour, two rings something like OO appearing in the centre of the wings. Reticulations and a narrow line are conspicuous along the outer margin. The hinder wings whitish, with a tinge of buffy yellow. Expanse of wings about one inch and a quarter.

The caterpillar has the head black, the body ferruginous with white spots and lines. It feeds on the oak, and the perfect insect appears in May and June.

7. The Orange Underwing (Brepha Parthenias), Perfect Insect, Caterpillar, and Pupa.

The Brephæ, observes Mr. Stephens, "are distinguished by the beauty of the under surface, and the liveliness of the colouring of the posterior wings, which are generally orange or flavescent with black or dusky fasciæ and margins;" the Palpi are concealed, and the head is densely pilose.

This elegant species is diurnal in its habits, appearing early in the spring, and flitting about in wooded places on rapid but vacillating pinions, generally over the tops of the bushes or patches of underwood, and occasionally descending and settling near little pools of water, but ever on the alert, and flitting off on the least alarm. It is very local in its distribution, being common in a few places only. Mr. Doubleday instances Ongar Park woods, and Mr. Stephens says that near Hertford, Highgate, Colney-hatch, and at Combe-wood he has seen and captured specimens, and that at certain seasons it is not uncommon.

The general colour is fuscous. The anterior wings are sprinkled with cinereous, and marked with several obscure whitish, strigæ; two decided spots are seated on the anterior margin; the first forming a transverse bar. The posterior wings are dull orange, with the base and inner margin broadly black, with an interrupted transverse bar of the same colour, and also a posterior marginal fringe. We may observe, however, that in the arrangement of the markings there is considerable variation. The caterpillar is yellowish green, with a bluish black lateral line, and some black spots. It feeds upon the leaves of the poplar and oak. The perfect insect appears in March.

In looking over the group of moths, thus briefly described, the most remarkable is the Goat moth (Cossus ligniperda). It is among the finest of our British species, and the caterpillar was selected by Lyonnet as the subject of his minute and laborious dissection, the results of which are described and delineated in his 'Traité anatomique de la Chenille du Saule,' the plates being engraved by the author. Of this work Cuvier says, "It is at the same time the chef-d'œuvre of anatomy and of engraving;" and certainly it is a monument of patience, industry, and skill, conspicuous among the works of science. The caterpillar of this moth we have stated to feed on solid wood, boring galleries as it gnaws its way into the heart of the oak, willow, or poplar; and it may occasion no little surprise to learn that a caterpillar is capable of mining through the hard trunks of trees: such, however, is the fact; and Cuvier says it emits from the mouth an acrid and fetid liquor, which, it would appear, has the property of softening the wood; of this, however, we are by no means certain.

As this caterpillar lives for the space of three years before undergoing its final change, it is not unreasonable to ask in what manner does it spend the colder months of the winter? We may answer—apparently in a state of hybernation or torpidity. Not contented with the maze of galleries it has already scooped out, and which perhaps do not afford it sufficient protection, it begins before the arrival of the severe season to scoop out a cell or chamber in the bole of the tree, if it does not find one already prepared; and to this it retires, and bending its body, sinks into repose. Mr. Rennie informs us that on sawing off a portion of an old poplar in the winter of 1827, he found such a cell with a caterpillar coiled up in it. "It had not, however," he says, "been contented with the bare walls of the retreat, which it had hewn out of the tree, for it had lined it with a fabric as thick as coarse broad-cloth, and equally warm, composed of the raspings of the wood scooped out of the cell, united with the strong silk which so many species of caterpillar are capable of spinning. In this snug retreat the caterpillar, if it had not been disturbed, would have spent the winter without eating, but upon being removed into a warm room, and placed under a glass along with some pieces of wood, which it might eat, if so inclined, it was roused for a time from its dormant state, and began to move about. It was not long, however, in constructing a new cell for itself, no less ingenious than the former. It either could not gnaw into the fir plank, on which it was placed with a glass over it, or it did not choose to do so, for it left it untouched, and made it the basis of the edifice it began to construct. It formed in fact a covering for itself precisely like the one from which we had previously dislodged it, composed of raspings of wood given it as food, the largest piece of which was employed as a substantial covering and protection for the whole. It remained in this retreat motionless and without food, till revived by the warmth of the ensuing spring, when it gnawed its way out, and began to eat voraciously, to make up for its long fast." The cell, or rather cocoon, in which the pupa state is assumed, and the last change undergone, is of similar manufacture, but of stronger and closer texture. It is well known that a large caterpillar feeding on the wood of the oak, according to Pliny, was esteemed by the Romans a delicacy for the table, and was purposely fattened with 'farina.' Ray and Linnæus are inclined to think that the caterpillar thus prized was the present; but it is impossible to arrive at a certainty on the subject. It is, however, surprising to find that the taste of the luxurious Romans agrees with that of the savage natives of Australia as respects the use for food of wood-eating caterpillars. Besides the Bugong moth, which is very oily, and accounted when pounded delicious fare, the Australians relish certain caterpillars which feed on the substance of the grass-tree and the wattle-tree: they are eaten either raw or roasted; and when the natives are taunted with eating such disgusting food, they invariably retort upon the European by accusing him of eating raw oysters, which they regard with perfect horror.

The Doctor in Abyssinia.—Whilst invalids of all classes daily flocked to the camp of the Europeans for medical assistance, applications were not wanting from the palace in proof of the reputation acquired. One of the princesses royal, who had been lodged with the illustrious visitor from Achun-Kurra, in the crimson pavilion presented by the British government, found herself in need of advice; and, on being visited, lay concealed beneath the basket pedestal of a wicker dining-table, whence her sprained foot was thrust forth for inspection. Divers respectable duennas of the royal kitchen, who had been severely scalded by the bursting of a pottage-cauldron, were also treated with success when they had been given over by the body-physician, at whose merciless hands the sobbing patients had been plastered over with honey and soot; and a mutton-bone was extracted from the throat of a page, where it had been firmly wedged for three days. But the cure which elicited the most unqualified and universal amazement, was that of a favourite Baalomual, who, labouring under a fit of apoplexy, which had deprived him of animation, was suddenly revived by venesection, after fumigation with *ashkoko goomun* had been tried without the smallest avail, and preparations were already commencing for his interment.—Medicine, in fact, now engrossed the entire of the Royal attention. Phials and drugs without number were sent to the tent, with a request that they might be so labelled as to admit of the proper dose being administered to patients labouring under complaints for the removal of which they were respectively adapted. Two or more invalids, who objected to be seen, were certain to arrive at the palace within every four-and-twenty hours; and no subterfuge that ingenuity could devise was left untried by which to augment the already ample stock of pills on hand.—*Major Harris's Highlands of Ethiopia.*



[Bodiam Castle, Sussex.]

BODIAM CASTLE.

Bodiam, or Bodiham, Castle is situated on the east side of the county of Sussex. A short distance to the west of the castle is the village of Bodiam, which is four miles north-east from Robertsbridge, and about twelve miles west-north-west from Rye. Bodiam Castle is on the north side of the river Rother, whence water is artificially conducted to supply the broad moat which surrounds the castle, and which looks like a small lake. The form of the castle is nearly a square, with a round tower at each of the four corners, and a square tower in the centre of the east, west, and south sides. The great gateway is in the centre of the north side, and is flanked by two square towers, with machicolated battlements,* and the entrance is further defended by an iron portcullis. Above the gateway, on the exterior wall, are three escutcheons with the arms of Bodiam, Dalyngrigge, and Wardeux. The approach to the great entrance is by a causeway, which was defended by an advanced gate, of which there are still some remains. There is a smaller gateway on the south side, which had an inner as well as an outer gate, but the inner gate has been destroyed, and a cottage built on the site. The towers are lighted by loopholes and small windows little better than loopholes. The length of the east and west sides, measured from centre to centre of the corner towers, is one hundred and sixty-five feet; the length of the north and south sides, similarly measured, is one hundred and fifty feet. The remains of the chapel, the hall, the kitchen, and other apartments and offices, are parallel to the main walls, and leave in the centre an open area of eighty-seven feet by seventy-eight feet.

The situation of the castle is low. The style of architecture is French, rather than English, and is similar to that of the castle of Amberley, in the same county, which was built about the same time. Bodiam Castle is a noble pile of ruins, and with its massy but crumbling towers, mantled with ivy and reflected in the broad moat, produces an effect highly picturesque, filling the mind with reflections not unpleasing on times of insecurity, violence, and bloodshed which have fortunately long since passed away.

Bodiam Castle was erected by Sir Edward Dalyngrigge in the year 1386. Sir Edward belonged to a family of great consequence in Sussex, and was engaged in the French wars of Edward III. He married the heiress of the family of Wardeux, who were lords of Bodiam. In the 31st year of the reign of Henry VI., Philippa, the daughter and heiress of Sir Richard Dalyngrudge, married Sir Thomas Lewknor, who also belonged to a family of high station in the county, several members of which had been knights of the shire, and nine of them high sheriffs. In the civil war of Charles I. the Lewknor who was then proprietor of the castle was a firm loyalist; the consequence of which was, that his castle was dismantled by Waller, and his property passed by alienation to the Earl of Thanet, from whom the lordship of Bodiam was purchased by Sir Thomas Webster, and descended with his other estates to Sir Godfrey Webster: it has now become the property of the Fullers, by whom it was purchased in order to prevent as much as possible the decay and dilapidation of the castle.

* In castellated architecture the battlements frequently project beyond the wall, leaving intervals suitable for throwing down stones, or pouring melted metal, or discharging missiles perpendicularly on the heads of the assailants. Such openings are called machicolations, and such a battlement is said to be machicolated.

ENCROACHMENTS OF THE SEA ON THE LAND.

In a former article we briefly described some of the modes in which dry land encroaches on the sea. We may here notice some examples of the opposite action, in which the sea encroaches on the land.

In most cases of this kind the effects are produced by the wearing action of tides, waves, and currents, continued uninterruptedly for ages; first destroying portions of the margin of the land, and then transporting those broken fragments to other places. The eastern coast of Britain is remarkably exposed to these effects on account of the double current, or a double system of tides, observable in the German Ocean. When the great tidal current flows from the Atlantic towards Britain, it divides into two portions at the Land's End; one of which passes along the English Channel towards Dover, while the other passes round the west of Britain towards the Orkney and Shetland Isles. This latter current, then bends round to the east and the south, and flows on southward between Britain and Denmark. Here the two currents meet; one going northward from Dover Straits, the other southward from the Orkneys; and the action thus becomes so considerable, that the shore is ground or worn away by the incessant passing and repassing of these currents. We will select from Mr. Lyell's work on Geology such details as illustrate this action.

The destructive process on the eastern shore has been manifested on all the different varieties of coast; on islands, promontories, bays, and estuaries; on bold lofty cliffs; on low shores. Towards the northern part of Scotland the action has been displayed in wearing away bold and rugged cliffs. The Shetlands, composed of hard rock, are exposed to very violent action from waves and currents; whereby steep cliffs are hollowed out into deep caves and lofty arches, while almost every promontory ends in a cluster of rocks, imitating the forms of columns, pinnacles, and obelisks. Huge blocks of stone are torn from their beds by the violence of the waves, and hurled along to a considerable distance. An instance has been known in which a mass of rock, eight feet long, seven wide, and five thick, was rent from its bed by the waves, and carried to a distance of a hundred feet. In other cases the sea has forced for itself a passage through rocks of the hardest porphyry. Rocky islands have by this means become mere clusters of rocks, the last shreds of masses once continuous; and thus among the Shetland Islands are to be seen isolated rocks of most fantastic form; in one case looking, at a distance, like a fleet of small vessels with spread sails; in others like needles, pyramids, huge icicles; while others defy any correct description as to form.

Passing southward along the east coast of Scotland, it is found that the destroying action shows itself more in filling up estuaries, and gradually attacking seaport towns. An old town called Findhorn, in Morayshire, has been swept away by the sea. The village of Mathers, in Kincardineshire, built on an ancient shingle beach, was carried away by the waves of the sea in one night, in 1795. At Arbroath, which stands on a rock of red sandstone, gardens and houses have been carried away since the commencement of the present century by encroachments of the sea. The lighthouses built at the mouth of the Tay have had to be removed farther inland, on account of the approach of the sea. At Newhaven an arsenal and dock, built in the fifteenth century, have been overflowed by the sea.

Along the east coast of England, from Northumberland to Kent, examples have been shown of the same system of destruction. At Bamborough, at Holy Island, and at Hartlepool, the sea has made considerable encroachments; while Tynemouth Castle, which now overhangs the sea, was once separated from it by a strip of land. At the projecting headland of Flamborough, the chalk cliffs are worn into caves and needles, and are gradually decaying; but on the coast between this spot and Spurn Point, consisting of beds of clay, gravel, sand, and chalk rubble, the destruction is still more rapid. There are now, off this coast, sandbanks in the sea which were marked in old maps of Yorkshire as the sites of the villages of Auburn, Hartburn, and Hyde. Hornsea, Owthorne, and Kilnsea are suffering gradually the same process of demolition. Ravenspur, which was at one time a rival to Hull in importance, has been so utterly destroyed that a sandbank, covered at high-tide, but dry at low, marks its site.

The shore of Lincolnshire has exhibited a double process of destruction and reclamation. The maritime district consists chiefly of lands that lie below the level of the sea, being protected by embankments. Much of this was at a remote period a well-wooded country; it was afterward overflowed by the sea; it has since been recovered by embankments; and the system of drainage now being carried on has for its object to make the district still more worthy of the name of dry land. So low is the coast of this county, that the wearing away of cliffs is hardly applicable to it; but in Norfolk and Suffolk this sort of destruction is going on. At Hunstanton the cliffs are constantly being undermined and precipitated into the sea. At Sheringham a striking instance of this encroachment has been exhibited. An inn was built there in 1805, and it was computed that seventy years would elapse before the sea would endanger it; the mean loss of land having been computed, from previous observations, to be somewhat less than a yard annually. But the rate of destruction afterward increased, insomuch that seventeen yards were swept away in six years; and in 1829 only a very small garden intervened between the inn and the sea. In that same year there was a depth of twenty feet of water at a spot where, less than fifty years before, there had stood a cliff fifty feet high, with houses upon it. The flag-staff of the Preventive Service station, near the same spot, was thrice moved in fifteen years, on account of the encroachment of the sea.

The ancient towns of Cromer, Shipden, Wimpwell, and Eccles have all disappeared. The Cromer of the present day is far inland of the former, and seems itself destined to destruction at some future day. There is a ruined tower of the church of Eccles still visible, the only relic of the town. So early as the reign of James I., the inhabitants prayed for a remission of taxation, on the ground that all their houses, except fourteen, had been destroyed by the sea. At Yarmouth a low tongue of sandy land stretches almost entirely across the mouth of what was once an estuary extending as far as Norwich; this is formed of sand brought down and lodged by the currents, and serves as a barrier to protect this part of the coast from wasting.

North and south of Lowestoffe the cliffs are gradually crumbling; at Corton, at Pakefield, and particularly at Dunwich. There are records to show that this last-named place has been subject to these visitations for eight or nine hundred years; for two tracts of land which had been taxed in the time of Edward the Confessor are mentioned in Domesday-Book as having been devoured by the sea. At subsequent periods the losses continued—at one time of a monastery, at another of several churches, afterwards of the old port, then of four hundred houses at once, of the church of St. Leonard, the high road, the townhall, the gaol, &c. The inhabitants retreated inland as fast as the sea encroached upon them, so that the name is still retained. There

was once a wood situated a mile and a half eastward of the present town of Dunwich, the site of which must therefore now be that distance to seawards.

Aldborough, Bawdsey, and other parts of the Suffolk coast, have suffered in a similar manner, if not to the same degree; and when we arrive at the Essex coast, we find the same changes in progress. Harwich is said to have owed its rise to the destruction of Orwell, a town which was overwhelmed by an inroad of the sea many centuries ago. Mr. Lyell thinks that the promontory on which Harwich stands will become an island in half a century; for he has found that the sea is gradually cutting away the isthmus which connects it with the land; and he hints that the inhabitants are hastening the destruction of their own town, by selling for cement the stones which roll down upon the beach, and which, if allowed to remain, might help to stem the action of the sea.

On the coast of Kent we meet with the interesting examples furnished by Reculver and the Isle of Sheppey. This isle is about six miles long by four wide. The cliffs are wearing away rapidly; the church of Minster, once in the middle of the island, is now on the coast; and it is supposed that if the present rate of destruction continues, the whole island will be annihilated in fifty years. Farther eastward we find a nearly straight line of coast where was once Herne Bay. It is true that name is still given to the spot; but it bears very little resemblance to a bay, for the waves and currents have by degrees swept away the ancient headlands. There was formerly a small promontory jutting out where the present pier is built; but this has been wholly annihilated. Reculver, between Herne Bay and Margate, was an important military station in the time of the Romans, and was in the time of Henry the Eighth distant one mile from the sea. In 1781 there was still a considerable space intervening between the church and the sea. The walls of the ancient Roman encampment, distant eighty yards from the church, were destroyed in 1780; and since then the sea has swallowed up the strip of land close to the church. The church still remains, with its twin towers of curious shape serving as a landmark to seamen; but it would have been destroyed before now had it not been for an artificial causeway of stones and wooden piles, erected as a barrier between it and the sea.

In the cliffs round near the North Foreland, the coast wears away at the rate of about two feet in a year; while nearer to Ramsgate the rate of destruction is somewhat greater. The Goodwin Sands, situated opposite this part of the coast, are believed to have been once dry land, and to have formed an island which was gradually washed away; for there is a tradition that the estates of Earl Goodwin, the father of Harold, were situated here; and it has been proved that there is a clayey foundation at a depth of a few feet beneath the loose sand. If this be so, there was probably an island formed of clay, which was gradually overwhelmed by the sea, and on which sand has been gradually deposited to a depth of fifteen feet.

The cliffs near Dover have been gradually worn by the sea, especially the "Shakspere" cliff. It will become an interesting question in future years how far the stupendous engineering works executed by Mr. Cubitt in this locality will enable the old cliffs to battle against their destructive enemy.

It has often been a favourite speculation that England and France were once joined by a rocky ridge extending from Folkestone or Dover to somewhere between Calais and Boulogne, and that this ridge has been worn away by the sea. The Straits of Dover are so shallow at one part, and the contour of the two coasts corresponds so much, that the opinion is regarded as being not improbable.

At Folkestone and at Hythe the cliffs exhibit proofs of the same wearing action; but between Hythe and Rye the land has gained from the sea the rich level tract known as Romney Marsh, which has been formed of the silt, or fine mud, deposited by the current flowing from west to east through the English Channel. Rye was once destroyed by the sea; but it is now two miles distant from it. Westward of this point we come to Hastings, where the cliffs are being gradually worn; and still more at Beachy Head. The whole coast of Sussex has been incessantly encroached upon by the sea from time immemorial; sometimes almost insensibly, at other times with violence. During a period of no more than eighty years, there are notices of about twenty inroads of the sea, in which tracts of land of from twenty to four hundred acres in extent were overwhelmed at once. In the reign of Elizabeth, Brighton was situated on that tract where the chain-pier now extends into the sea, being, in fact, situated on the beach under the cliffs, from which situation all the houses were washed away one by one.

Farther westward, on the Hampshire coast, the shore exhibits the effects of similar actions; and the same remark is applicable to Dorsetshire. The cliffs between Hurst Castle and Christchurch are so much undermined, that, within the memory of persons now living, it has been found necessary to remove the coast-road farther inland three different times. The church of Hadwell was once in the middle of the parish, though now near the sea. The peninsulas of Purbeck and Portland are gradually wasting away. In 1665 the cliffs adjoining the principal quarries in Portland gave way to the extent of one hundred yards, and fell into the sea; and in December, 1734, a land-slip to the extent of a hundred and fifty yards occurred on the east side of the isle. In 1792 a much more notable loss of land occurred, which was thus described in Hutchins's 'History of Dorset:'—"Early in the morning the road was observed to crack; this continued increasing, and before two o'clock the ground had sunk several feet, and was in one continued motion, but attended with no other noise than what was occasioned by the separation of the roots and brambles, and now and then a falling rock. At night it seemed to stop a little, but soon moved again; and before morning the ground from the top of the cliff to the water side, had sunk in some places fifty feet perpendicular. The extent of ground that moved was about a mile and a quarter from north to south, and six hundred yards from east to west."

At Lyme Regis the cliffs have fallen away at the rate of about a yard per year. Between Lyme Regis and Axmouth, in 1839, occurred that extraordinary land-slip described in our No. 505, which so well illustrates the destructive action of the sea on the coasts.

Near Penzance, in Cornwall, there is a projecting tongue of land, called 'The Green,' formed of granitic sand, from which more than thirty acres of pasture land have been gradually swept away in the course of the last two or three centuries. It is also said that St. Michael's Mount, now an insular rock, was formerly situated in a wood, several miles from the sea; and there are many indications that Cornwall is silently undergoing the same kind of destruction of coast as the other counties which we have mentioned.

Without following the remaining coasts of Britain, or passing to the Continent, these few details will suffice to convey an idea of the manner in which the sea encroaches on the land by wearing away the coast.

ON COLOURED AND VARIEGATED METALS.

Metals are among the few substances which are not commonly coloured by any artificial means, as a matter of ornament. Gold, silver, copper, brass, tin, steel, &c. have each their peculiar beauty when polished, and are in most cases left without any attempt at colouring. Iron is often coated with paint, quite as much to prevent it from oxidizing as to give it an ornamental appearance; and the same thing may be said of some other applications of metals; but the metallic lustre, in the majority of cases, is deemed more pleasing than any application of colour to metallic surfaces. There are, however, a few exceptions to this rule, which involve some rather peculiar details.

Coloured *foil* is one of the most common of these specimens. This foil is a very thin sheet or leaf of metal, used by the jewellers to place under a precious stone, in order to make it look transparent and to modify or heighten the colour; the lustre of the gem being heightened by a polished but colourless foil, the tint lightened by a lightly coloured foil, and lowered by one of dark colour. Such sheets are made of copper, of tin, of gold, of silver, or of some mixed metal. The copper foil, which is produced chiefly in Germany, is made somewhat in the following manner:—A very thin plate of copper is beaten gently on a polished steel anvil with a polished hammer, till it is as thin as writing paper; or it is brought to the same degree of thinness by a rolling-mill. The thin sheet thus produced is heated between iron plates, then boiled in an alkaline liquid to remove the colour, and then again hammered or rolled to the required thinness. The foil is polished on a convex plate of polished copper, whose surface is coated with chalk and water. The leaves of tin, which, when combined with quicksilver, form the under coating of a looking-glass, are brought to a thin and leaf-like state by nearly similar means; and so are likewise the square leaves of copper which are sold under the name of Dutch gold or Dutch metal. Indeed any metal which possesses a tolerable degree of malleability may be hammered or rolled out to a thinness which is more analogous to that of a leaf than to a sheet of metal.

The method of imparting brilliant colours to the metallic foil used for jewellery and other purposes, was first practised on the continent, and indeed it is still rather a foreign than an English branch of art. The basis of all such colours is a clear and transparent varnish, so tinted that it shall, with the natural colour of the metal beneath, give the required hue. For a blue colour, foils of copper, or of silvered-copper, are selected; and for other colours the nature of the foil selected depends on the experience of the workman. The leaves of metal require a little preparation before they are fitted to receive the hue of colour. A gum or glue of isinglass is prepared by steeping in cold water, boiling, and straining; and after the foil has been dipped in a weak solution of nitric acid, as a means of cleansing it, it is coated with the melted isinglass size by means of a camel-hair pencil. When this layer is dry, the metal is ready to receive the colouring ingredient, which varies in its character according to the tint required to be produced. For a blue colour, Prussian blue is the main ingredient, or else sulphate of indigo; for green, either acetate of copper or a mixture of blue and yellow; for red, either cochineal or sandal-wood; for violet, the tincture of litmus; for ruby, carmine; while the intermediate colours are mostly produced by combination of some two or more of the preceding. These various colours are laid on the foil in a liquid state; and when the tint is produced, and the surface quite dry, an external coating of colourless varnish completes the preparation, whereby the colour is protected from injury, a gloss is imparted to the metal, and the colour is developed with brilliancy.

Some years ago a kind of coloured or ornamented metal attracted a good deal of notice, from the singular beauty and richness of appearance, and from the difficulty of understanding how it could be produced. This is called by the French *moiré métallique*, a name implying clouded or watered metal. The metal has a singular crystallized appearance, in some respects similar to frost on a window in a winter's day, but far more brilliant and diversified.

The moiré métallique is a French production. It is formed of tinned iron plates, and the peculiar effect at the surface is produced by exposing the tin to the chemical action of acids. The application of this substance to the purposes of ornament was made about the year 1817; and the patentee, M. Allard, had to defend his patent against many infringements, in the French courts. The circumstances which were explained during these trials elicited the fact that the moiré is formed by the action of the tin on the iron at the place of contact; and that the effect of the acid is to dissolve and remove the outer surface of the tin so as to make the moiré visible; in short, that the acid does not produce the moiré, but only develops that which is already produced.

The mode of preparing the moiré métallique, as described in a French Cyclopædia, is very simple. Common tin plate consists of a very thin film of tin placed upon the surface of, and united to, a piece of sheet iron; and it is believed that the chemical action of the two metals one on another gives the varied and clouded effect that constitutes the moiré. As this clouded effect, however, does not exhibit itself through the whole thickness of the film of tin, and cannot be seen when the tinned iron is in the usual state, the art consists in removing just so much of the tin as will lay bare the united film of the two metals. This is a point of much nicety, for if the acid employed for this purpose be allowed to penetrate too deeply, it will lay bare some of the iron, and there will result dark spots instead of the silvery lustre and pearly appearance of the moiré. The chemical agent employed for this purpose does not seem to be very precise in its character, many different mixtures being named as fitted for the purpose; comprising among them nitric acid, muriatic acid, sulphuric acid, muriate of soda, muriate of ammonia, and distilled water; the one, however, which may be taken as the nearest type of the whole is a mixture of nitric acid, muriatic acid, and distilled water, in about equal quantities.

When the acid liquor is prepared, the plate of tinned iron, after being slightly heated, is sponged over with the acid liquor. The acid begins immediately to act on the tin; and as soon as the workman sees the moiré manifested in a distinct manner, he instantly plunges the sheet into a vessel containing clean water, and washes off the acid and the dissolved tin with a feather or a bit of cotton, but so gently as not to disturb the thin metallic film which constitutes the moiré. In proportion as the plate is more highly heated, or the acid more concentrated, the action on the metal becomes more rapid, so that the time required for producing the due effect varies from one minute to ten minutes, according to these circumstances. The acid is laid on very evenly and regularly, as the moiré would be more readily destroyed at any part where the acid lay in greater quantity.

When the moiré has been properly developed, the plate is carefully dried, and either varnished at once to protect it from injury, or temporarily coated with gum until varnish can be applied. The moiré, thus

prepared, has a silvery or pearly appearance; but it may have any required colour imparted to it by means of coloured varnishes.

A kind of moiré is occasionally produced without the aid of acids, by exposing the plate of tinned iron to such a heat as will melt the tin. While thus in a melted state, if the tin be allowed to cool gradually, the surface will present a crystallization or moiré of a peculiar kind; if suddenly cooled by being plunged in cold water, the moiré assumes a different character; if the surface be unequally cooled by sprinkling cold water upon certain parts of it, a more diversified moiré results; and if a current of cold air be blown upon it, a yet further diversity is produced. So, on the other hand, by heating the tinned iron unequally, a moire is developed; a device or design may be traced on the tinned surface by the point of a flame urged by a blow-pipe; and as the tin, which is thus liquified all along the course of the flame, crystallizes as it cools in a form different from that which the other parts of the surface present, the pearly moiré results.

Some years ago M. Nobili, a distinguished natural philosopher of Reggio, brought into notice a very beautiful mode of colouring metals, by an agency of a simple and remarkable nature. The plates which he exhibited as examples of the art of *metallochromie*, or metal-colouring, were sheets of steel, ornamented with regularly disposed spots, coloured of a greenish yellow, pure yellow, blue, and other colours, somewhat similar to those exhibited by bright copper plates when exposed to the action of heat; the backs of the plates being of a uniform brown colour.

M. Nobili presented some of the plates to the French Society of Arts in 1828; and the society appointed a committee of its members to report on the nature and merits of the invention. In the Report, which was drawn up by M. Gaulthier de Claubry, it was stated that the colours were very brilliant, the tints well harmonised, and so durable that they could not be destroyed except by a high heat. M. Nobili appears to have so disposed the coloured spots on his steel plates as to lead to the production of figures and devices; and from the following passage in the Report the committee seem to have viewed the method as the opening of a new kind of decorative art:—"We can easily form a just idea of the extent to which it might be possible to carry this branch of manufacture, when we remark that many metals assume their colours in very different orders by the application of heat; and we can easily conceive that, in the hands of a skilful man, and one well conversant with commerce, the greatest advantages might be derived from the employment of this new branch of industry. Thus, for instance, nothing presents more harmony than gold, as its tints are very different from those afforded by heating steel. It is upon this last metal that all the designs presented by M. Nobili have been executed. Silver likewise affords different colours on applying heat; and an experienced artist cannot fail to make many fine applications of M. Nobili's process."

Nobili did not explain to the committee the mode in which he produced his metallochromes, and no one at that time seems to have guessed rightly as to the mode of proceeding. He continued to practise the art till his death; and it was, we believe, not until a comparatively recent period that the very curious nature of the process was made public. It is now known that the metallochrome is a result of galvanic action; and that the coloured spots are formed by a layer of oxygen, or of some other chemical substance, deposited on the metal, in a manner somewhat analogous to that in which a layer of copper is deposited in the electrotype. Nobili's mode of proceeding was nearly as follows:—A plate of steel, or of platinum, was placed at the bottom of a convenient vessel, and in this was poured a small quantity of solution of acetate of lead. A wire was suspended over the plate, so as just to dip in the liquid, but not to actually touch the plate. The plate was placed in connection with one pole of a galvanic battery, while the wire was connected with the other; and a galvanic current was thus established, which gave rise to a series of coloured rings on the plate, surrounding the point immediately under the wire. As a wire was thus the means of producing coloured spots and rings, Nobili next used to produce larger surfaces similarly coloured; and after many difficulties he succeeded, by means of one plate suspended over, but not in contact with, another, in producing surfaces of surpassing beauty. It is believed that these colours do not result from an actual corroding of the texture of the metal itself, but from a deposition thereon of a very thin layer, a layer which adheres very firmly to the metallic surface, but which is, at the same time, distinct from it, and can be removed from it by the agency of heat. The colours vary according to the varying thickness of this minute film.

About four years ago Mr. Gassiot communicated to the Royal Society a method which he had adopted for producing coloured devices on a metal plate by similar means. A highly polished steel-plate was placed in a porcelain soup-plate, and a filtered solution of acetate of lead was poured upon it. A piece of card board, out of which the required device had been previously cut with a sharp knife, was then placed upon the steel plate. Over the card, and resting on it, there was fixed a ring of wood, a quarter of an inch thick, the inner circumference of which was of the same size as the figure. A convex copper-plate was made so that its outer edge might rest on the inner part of the wooden ring, and its centre placed near but not in actual contact with the card board. Matters being thus arranged, the steel was connected with one pole of the battery, and the copper with another; and in less than half a minute a party-coloured device was produced on the steel through the perforation in the card. These colours varied according to the distance of the different parts of the copper-plate from the steel-plate; and when the experiment was tried with the concave side of the copper-plate downwards, instead of the convex, the same colours appeared, but in inverse order.

This beautiful art has been but little practised hitherto; but we may reasonably expect that it will be brought to the aid of the decorative arts when better known.

Muscles of the Hand.—In the palm of the hand, and between the metacarpal bones, there are small muscles (*lumbricales* and *interossei*) which perform the finer motions,—expanding the fingers, and moving them in every direction with quickness and delicacy. These small muscles, attached to the near extremities of the bones of the fingers where they form the first joint, being inserted near the centre of motion, move the ends of the fingers with very great velocity. They are the organs which give the hand the power of spinning, weaving, engraving; and as they produce the quick motions of the musician's fingers, they are called by the anatomists *fidicinales*. The combined strength of all the muscles, in grasping, must be very great; indeed, the power is exhibited when we see a sailor hanging by a rope, and raising his whole body with one arm. What then must be the pressure upon the hand? It would be too much for the texture even of bones and tendons, and certainly for the blood-vessels and nerves, were not the palms of the hands, the inside of the fingers and their lips, guarded by cushions. To add to this purely passive defence there is a muscle, which runs across the palm, and more especially supports the cushion on the inner or ulnar edge: it acts powerfully as we grasp; and it is this muscle which, raising the edge of the palm, hollows it, and adapts it to lave water, forming the cup of Diogenes.—*Bell on the Hand.*

A DAY AT THE FELLING CHEMICAL-WORKS, NEWCASTLE.



[Soda-Furnaces, Felling Chemical-Works.]

The factory which will form the subject of our present "visit" is one of a highly interesting class; a class influenced both by political and by scientific events in a remarkable degree: we allude to *Chemical Works*—those large establishments wherein are manufactured the chief acids, alkalis, and salts employed in science or in the arts.

That such establishments should be affected by the current of scientific discovery is what may reasonably be expected, since every advance in our knowledge of the constitution of bodies is likely to work changes in the modes of producing those substances. But in what way political matters are found to bear on the question may not be so obvious. A few considerations will, however, tend to show the kind of connection between these apparently disconnected agencies. If a manufacturer prepares certain chemical substances, (say) from sulphur; and if political, or diplomatic, or fiscal disagreements should occur between England and the country whence this sulphur is produced, then the manufacturer might be constrained to procure his sulphur from some other source, perhaps by a complicated process on one of the English ores of sulphur. Again, suppose the English government removes the tax previously imposed at a heavy rate on some article of abundant supply, such as common salt, then the manufacturer may be induced to employ this material as a fund whence he may procure acids or alkalis previously procured from a more expensive source. Now these are not merely supposed cases; they have actually occurred within the last few years, as we shall show farther on; and they illustrate the kind of effect which legislative or political occurrences are calculated to produce on chemical manufactures. The imposition or the removal of an excise duty on a commodity of home production; the imposition or the removal of a customs' duty on an imported foreign product; the establishment or the cessation of commercial intercourse with a country richly provided with some commodity which we require in our manufactures; the concentration, in the hands of a few, of a commodity required by the many; the legislative enactments which occasionally give rise to a demand for a particular commodity at a particular time;—all or any of these may work great changes in the arrangements of an establishment where chemical manufactures are carried on, irrespective of the still greater changes which naturally result from scientific discoveries in chemistry.

Chemical manufactures, like most others on a large scale, are carried on chiefly in the midland and northern counties. In most instances the chemical works are situated somewhat beyond the precincts of a large manufacturing town, since they require more space than can conveniently be procured within a town, and are liable to give off vapours and gaseous products, which are better at a distance than in close proximity to dwelling-houses. They are also generally situated near seaports, for convenience of shipment. Glasgow, Newcastle-upon-Tyne, and Liverpool are perhaps the three principal centres for this class of manufactures; and it is to one of these three that our present details will relate. By the kindness of Messrs. John Lee & Co., of the Felling Chemical-Works, near Newcastle, we hope to be enabled to convey a general idea of the nature and arrangements of such establishments as these. In no one establishment can we see more than a few chemical substances under process of manufac-

ture; for this, like all other departments of industry, is subdivided into distinct branches: but a few of the leading substances may be taken as types of the whole.

The busy Tyne exhibits along both its banks, all the way from Newcastle to Shields (a distance of seven or eight miles), a continued succession of factories—here of glass, there of coarse pottery; at other spots of chemicals, of lead, iron-works, oil-mills, engine-factories, and others which tend to swell the importance of this bustling and thriving neighbourhood. Of these seats of manufacture, the chemical works are the most conspicuous, from the enormous height of their chimneys. No other factories or works have such lofty chimneys as chemical works, because no others give forth so many gaseous products likely to be of a deleterious character. In some of these instances the chimneys considerably exceed St. Paul's cathedral in height; and indeed there is in Scotland one which is a hundred feet higher than St. Paul's! In past times many of the chemical works were regarded (and correctly so) as pests and plague-spots, bringing desolation on all the vegetable products near them; blasting the trees, and stunting the growth of almost every kind of field and garden produce. Numerous were the disputes between the various parties on these points; and an avowed good was, in this respect, always accompanied by an equally avowed evil. But modern research has wrought surprising changes in this respect. Every year adds something to the list of processes whereby a deleterious gas, previously sent forth into the atmosphere, becomes a source from which other and valuable products are derived; and it is scarcely too much to expect that such improvements will gradually be made as to render the lofty chimneys less and less necessary—leaving them as memorials of a past and less skilful state of the manufacturing arts.

This being premised, we will proceed on our visit. The Tyne separates Newcastle from Gateshead, the latter being to the former what Southwark is to London; and at a distance of a mile or two eastward from Gateshead is the village of Felling, where the chemical works are situated. The works occupy a position between the South Shields Railway and the river; and like most places in the neighbourhood, have abundant means of intercourse with the great central depôt, Newcastle, by cheap railways and still cheaper steamboats. The Londoners have their fourpenny steamers, but the good folks of Newcastle can have a nine miles' trip for threepence; and this facility, together with railways running along both banks of the Tyne, gives rise to an incessant and extensive intercourse.

On approaching the works, it is soon evident that they are of the class where a large number of buildings are spread over a great area of ground, rather than exhibiting one huge building, such as is so often seen in the cotton districts. The buildings are of various sizes and shapes: some lofty, some shallow; some long and broad, others nearly square; some exhibiting within dry and dusty processes, others heat and vapour, others vessels and liquids; one with a lofty and well-proportioned chimney, others with chimneys of more humble dimensions. Narrow passages and square courts separate these buildings one from another; and while passing through these passages, and the buildings adjacent to them, we become sensibly alive to the odour of the acids and other chemicals under process of manufacture.

The internal arrangements, and the nature of the operations carried on, will be best described by taking the chief objects of manufacture, and tracing them through their successive stages of progress.

Common sulphur and common *salt* are the two great agents in the production of the chemicals in most familiar use. Sulphuric acid, or 'oil of vitriol,' chloride of lime, or 'bleaching-powder,' muriatic acid, or 'spirit of salt,' the soda-ash employed by glass-makers and soap-makers, the common soda employed in washing—all result from certain modes of applying one or other of these cheap and abundant substances; and all are made at the Works now under our notice. Nothing can more beautifully illustrate the general character of chemical composition and decomposition than the steps by which one substance becomes transformed into another, as developed at chemical work: the production of an acrid and poisonous body from harmless ingredients; the production of a liquid from two gases, or of a gas from two liquids; the generation of colour from the mixture of two colourless bodies; the transformation of an opaque earth into a colourless crystal;—these and analogous phenomena are constantly presented during the progress of chemical manufactures.

The production of sulphuric acid is the first point to which we will direct attention, and is, of all those carried on at the great chemical works, one of the most interesting to a stranger, who can hardly fail to be struck with the enormously large apparatus employed in some parts of the process.

Sulphuric acid is composed of sulphur and oxygen; and the principle of the manufacture rests on the abstraction of oxygen from the atmosphere, under circumstances which enable it to combine with common sulphur or brimstone. Nature supplies the one ingredient most abundantly in the air which surrounds us; while the volcanic districts of Sicily supply the other. The greater part of the sulphur employed in English manufactures comes from Sicily or Italy; because, unless commercial tariffs and restrictions interfere with its natural price, it can be obtained thence cheaper than from our own mineral districts. The English sulphur is only found in combination with other substances, such as in ores of copper and of iron, and requires a careful process for its separation. Hence, at the Felling Works (and these illustrate the general system of arrangements), when commerce is allowed to follow its own track between Italy and England, the Italian sulphur is used; whereas, in case circumstances should drive up the price of that commodity beyond a certain limit, apparatus is provided for the extraction of sulphur from iron pyrites, a mineral extensively found in this country.

About six years ago the price of Sicilian sulphur was driven up rapidly, through the following circumstances. (We quote from the 'Penny Cyclopædia.') "The *Sicilian* sulphur-mines are the property of individuals; and from fifteen to twenty English firms, settled in Sicily, are engaged in the trade. In 1836 M. Taix, a Frenchman, laid before the Sicilian government a project for establishing a company, which was to have the exclusive right, during ten years, of purchasing Sicilian sulphur at fixed prices, on condition of spending 10,000*l.* a year in constructing roads, and exporting one-third of the quantity produced in Sicilian vessels. The British merchants becoming alarmed, the Sicilian government, in reply to the British ambassador, stated that no such project would be adopted; it would have been in direct contravention to certain commercial treaties between the two governments. The Sicilian government did, however, enter into a contract with M. Taix, and on the 4th of July, 1838, notice was given at Palermo, that the monopoly would come into operation on the 1st of August ensuing. The negotiations respecting this monopoly were conducted with great secrecy; and it came into operation so suddenly that twenty-four vessels lost their cargoes. The British lessees of mines, and all others, were compelled to produce only a fixed

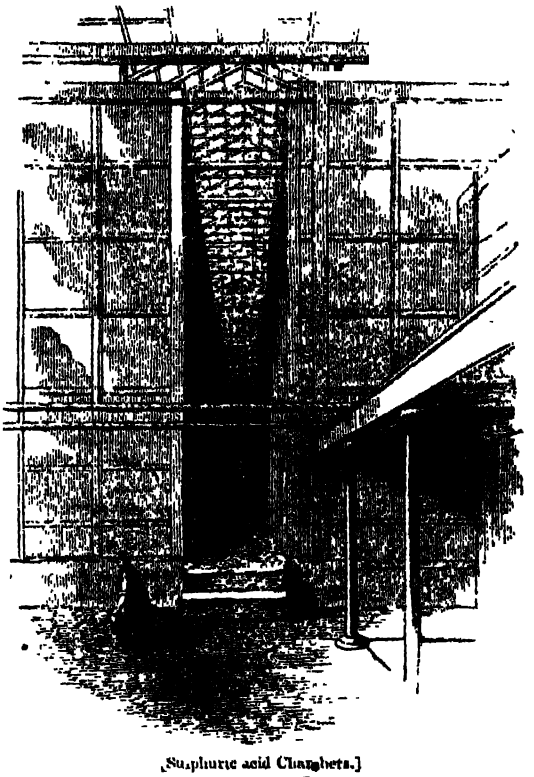
quantity of sulphur; prices rose from 6*l.* 10*s.* or 7*l.* to 13*l.* and 14*l.* per ton, and contracts could not be completed. Previous to the monopoly, 484 British vessels sailed from the ports of Sicily to the United Kingdom; but in the first fifteen months after the monopoly the number was only 157. At length the British government took very decided steps to put an end to a monopoly established in the face of commercial treaties: the coasts of Sicily and Naples were blockaded by our ships of war, and the Sicilian government, no longer daring to uphold the monopoly, accepted the mediation of the King of the French in adjusting the dispute with the British government." After this, the trade resumed its former channel.

In one of the buildings at the Works is an extensive range of upright furnaces, adapted for the extraction of sulphur from iron pyrites, in case such occurrences as those should again interfere with the sulphur-trade. Into these furnaces is placed the pyrites, a mineral containing rather more than half its weight of sulphur, and rather less than half iron; and by a careful series of processes, a large per centage of the sulphur is obtained in a form fit for the manufacturer of sulphuric acid. But at the present time the price of Sicilian sulphur is sufficiently low to render the adoption of the English mineral unnecessary. This is one of the points to which we referred in illustration of the intimate connection between commercial legislation and chemical manufacture.

The Sicilian sulphur is brought over to this country 'in bulk,' that is, stowed away in the hold of the ship. It is prepared at the Sicilian sulphur-works in masses weighing about half a ton each; and these masses generally become broken into small rubble or fragments by the time they reach the English chemical-works. So enormously has the use of this commodity increased in England, that whereas five thousand tons were used in 1820, ten times that quantity is now used annually; and we import, in fact, more than half of all the sulphur produced in Sicily.

Beginning from the heap of sulphur lying in one of the warehouses at the Works, we have to follow it through its subsequent stages. In a furnace-room are numerous furnaces for burning the sulphur, arranged on each side of a hollow wall, through which the gaseous products ascend into large vessels. Every one knows that sulphur will kindle very readily, and it is equally well known that a very suffocating gas accompanies the blue flame resulting from the ignition. This gas is sulphurous acid, and the object of the manufacturer is to collect it carefully. The furnaces are a kind of flat quadrangular chest, measuring about seven feet by five; they are made of iron, and are capable of being closed in perfectly or nearly air-tight. There is a door in the front of each furnace, through which is introduced about a hundred pounds of sulphur at a time; the sulphur is kindled, the door is closed (leaving a narrow aperture for the entrance of the air required to support the combustion), and in about two or three hours the whole of the sulphur, except a very small residue or ash, is converted into sulphurous acid vapour, which ascends the hollow wall to fitting receptacles. If one of the doors be opened, we can see the lambent blue flame from the burning sulphur, and become sensible of the well-known odour resulting from the combustion.

The sulphurous acid gas passes from these burners or furnaces into vessels so vast that it is difficult to estimate them by a common standard. Brewers' vats, 'Heidelberg tuns,' all sink into insignificance when compared with these vessels. There are two of them, each nearly two hundred feet in length, twenty in width, and twenty in height; and four others about half this length. They are not sunken tanks or cisterns, but vessels erected on the ground, formed of sheet-lead, and held together by appropriate frame-work. There are avenues between the vessels, or 'chambers,' as they are called; and nothing less than a walk from one end to the other of one of these avenues (such as is slightly sketched in the adjoining cut) can convey an adequate idea of the dimensions.



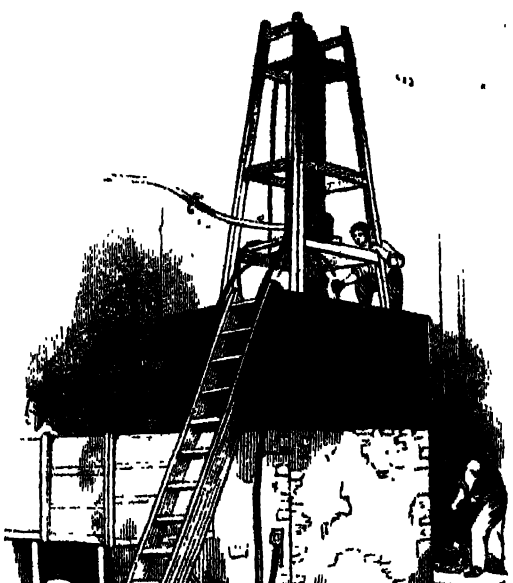
[Sulphuric acid Chambers.]

Into these chambers the gas passes; but not alone: there are some beautiful chemical changes involved before the gaseous sulphur*ous* acid can be converted into liquid sulphur*ic* acid. The latter contains a little more oxygen than the former, for the same amount of sulphur; and a curious agency is employed for the supply of this additional portion. Into the sulphur-furnace is introduced a little nitrate of soda, placed in a dish on a stand above the burning sulphur: the heat from the sulphur occasions the evolution of nitrous acid vapour from the contents of this dish; and this vapour enters the leaden chambers in company with the sulphurous acid vapour. The two gases will not exert any particular effect on each other while in this condition; but if moisture be present, an action immediately commences. There is a steam-boiler arranged near the chambers, from which a supply of steam is obtained; and this steam, flowing into the chambers with the two gases, effects a transference of oxygen from the one to the other. The sulphur*ous* acid only requires a little further supply of oxygen to transform it into sulphur*ic* acid; and this supply it obtains from the atmospheric air (which enters with it for the purpose) by the agency of the nitrous acid gas and the steam. Sulphuric acid is not a gas: it combines with the water of the steam, and accumulates at the bottom of the leaden chambers, from whence it is drawn off at stated intervals.

The chemical niceties involved in many parts of this process are very great; but into these we need not enter. Suffice it to say that from tasteless sulphur,

from the salubrious oxygen which we breathe, and from common steam, are produced the hot and burning sulphuric acid, or oil of vitriol, in the form of a very dense liquid. This liquid falls into tanks, from whence it is pumped or forced up into other vessels, to be either sold in that state, or to be concentrated to a greater degree of strength. Such is the corroding nature of this acid, that few metals are found capable of resisting it; and on that account lead is extensively employed in the manufacture, this being one of the exceptions. For instance, the fumes pass through a leaden pipe two feet in diameter; the chambers are of sheet-lead; and the liquid acid falls into a leaden tank.

Few things are more remarkable in the manufacture than the enormous expense which this corroding tendency has entailed on manufacturers of this acid. In order to give a higher degree of concentration to the acid, it is distilled by the agency of heat; but lead will not bear this heat, and other common metals will not bear the action of the acid. Under these circumstances the stills are made either of glass or of platinum. When glass stills are used, they are heated by means of hot sand, into a bed of which they are placed; but breakages so frequently occur, that the use of platinum has almost superseded glass for this purpose. Platinum is a metal which will resist the action of nearly all acids; and as it will also bear a most intense heat, it is invaluable for such purposes as these. But it is procurable in such small quantities, and is brought into a marketable form with so much difficulty, that its commercial value is enormous. For concentrating the sulphuric acid at the Felling Works there is a platinum still or retort which weighs about a thousand ounces,



[Platinum Still, for concentrating Sulphuric acid.]

and cost nearly as many guineas, the value of the metal being about four times as much as that of pure silver! As the costly metal is made no thicker than is absolutely necessary, the portion of it exposed to the fire is protected by an iron casing.

It does not form part of our object here to describe manufactures in metal; but a few words may be introduced explanatory of the reasons why the production of platinum vessels is a difficult and tedious process. As the metal cannot be procured naturally in large masses, and as the heat of furnaces will not melt it, it is brought into workable form in an extraordinary manner, first developed by Dr. Wollaston. It is found in the metallic state, in small grains, mingled with grains of many other metals. The other metals are removed from it by chemical means, and the platinum is then presented in the form of small grains. These grains are crushed in a wooden mortar with a wooden pestle, to the state of powder, which powder is brought to a pasty form with water. The paste is put into a small ingot-mould, and pressed very powerfully by an appropriate machine, by which it is compacted into a solid form, the grains of powder cohering by a sort of welding property. This ingot is placed upon a charcoal fire, to drive away the remaining moisture; it is next exposed to the fiercest heat which furnaces can give, to remove every other extraneous substance from it; it is next hammered in particular directions, to give it a temper and toughness; and is then in the form of a small solid piece, fit to be rolled and forged into sheets, or any other practicable form. All this labour, bestowed upon a small bar only six or seven inches long, necessarily makes the manufactured article very costly.

After the acid has been concentrated to a density not much less than double that of water, it is cooled, and finally packed in large glass carboys enclosed in osier baskets.

As there do not appear, in common life, to be very many uses for sulphuric acid on a large scale, it may seem strange why such vast quantities should be made; since a large portion of all the sulphur imported is used in making this acid, and the acid produced is nearly three times as great in weight as the sulphur employed. But it is as an agent in producing many other important chemical substances that this acid is so largely used; and to some of these we will next direct our attention.

Soda, a substance so largely employed in glass-making, in soap-making, in bleaching, in washing, and in many other operations, is at the present day produced by the application of sulphuric acid to common salt; and the manufacture is one of those carried on at the Felling Works. Most remarkable have been the changes in the mode of producing this useful alkali. Some years ago the duty on salt (now employed in the manufacture) was almost unprecedentedly high: it amounted to 30*l.* per ton; whereas the commodity can at the present day be purchased for ten or twelve shillings per ton, that is, the duty was once fifty or sixty times as great as the article itself can now be actually bought for! Under these circumstances, the production of soda from this substance was not thought of commercially. At that time the soda was prepared from *kelp*, a kind of sea-weed found on the shores of the Scottish Highlands and Islands; the kelp was dried and burned, and from the resulting ash was obtained a very small per centage of soda. *Barilla*, obtained from the ash of an Italian sea-weed, was also employed for the same purpose. But common rock salt has now nearly superseded the latter, and wholly so the former. Indeed so marked has been the change, that though the commercial and manufacturing advantages have been immense, the result has been in some respects painful, since the Highlanders who used to be employed in the kelp manufacture are now wholly deprived of that source of income.

Common salt is chemically designated chloride of sodium; common soda is chemically carbonate of soda; and the process of manufacture consists in separating the sodium from the chlorine, and making it the chief

element in a new compound: and it instructively illustrates the way in which one chemical process necessarily involves another — that the very same operation which leads to the production of carbonate of soda from one element of the salt, leads to the production of muriatic acid from the other. So rapidly has this branch of manufacture extended, that it was estimated in 1838 that more than seventy thousand tons of carbonate of soda were made from common salt in that year.

On entering those buildings of the Works where the soda process is carried on, the peculiar odour of muriatic acid is very perceptible, very different from that diffused throughout those before visited. The rock salt is procured from the vast beds at Northwich in Cheshire. It is exposed to various processes, by which the chloride of sodium is converted into a sulphate of soda; then this into what is called ball-soda; then this into the soda-ash employed in making soap and glass; and, lastly, this into the crystallized soda of the shops. Throughout these operations a succession of chemical changes ensues, not less remarkable than those in relation to sulphuric acid.

A given weight of salt is placed in a reverberatory furnace, that is, one in which the heat is echoed or reflected down from a concave roof upon the ingredients in the furnace. The salt is placed in a leaden pan within the furnace, and sulphuric acid is let down upon it through a leaden pipe in the roof of the furnace; or rather the decomposition is first partially effected in an iron pan heated below, and then finished in the reverberatory furnace. The salt liquefies in the acid; and the heat which is brought to bear on the mixture soon causes a gaseous vapour to ascend. This gas is muriatic acid gas, containing as one of its ingredients the chlorine which had before been in the salt. The muriatic acid thus produced has often been a source of great trouble and expense to manufacturers. It is so deleterious, that if allowed to mingle with the atmosphere near the ground it would do great mischief; and hence the giant chimneys which such works exhibit, intended to carry off the gas to a great height. The gas, however, is now converted to a liquid form by an ingenious arrangement. All the furnaces discharge their muriatic acid gas into a bulky stone tower about forty feet high by eight feet square. This tower is filled with coke, upon which a stream of water is constantly falling from above; and the gas, ascending the tower from the flues of the furnaces, meeting with an innumerable series of little streams of water trickling through the coke, becomes absorbed by the water, and falls again in the form of liquid muriatic acid. Thus a double advantage is gained by this plan: the muriatic acid is preserved in a form which renders it available for other departments of manufacture; and the atmosphere is saved from admixture with such a deleterious ingredient.

Meanwhile the salt has greatly altered its form. When the muriatic acid, by the application of heat, and by frequent stirring, has been removed from the furnace, the pasty mass which remains is sulphate of soda; and this sulphate is, at a particular period, drawn out of the furnace in a dry state.

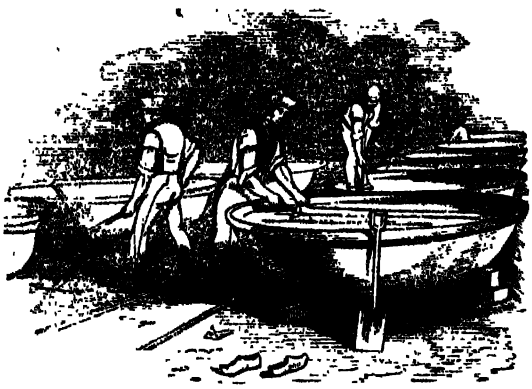
Then ensues another process, in which the chemical changes are too complex to be minutely detailed here, but whose general character may be pretty clearly explained. In one of the buildings are six furnaces in a row, upwards of twenty feet long each: these are called *balling-furnaces*, for the conversion of sulphate of soda into ball-soda. The sulphate is mixed up with chalk or lime, and with coal, both ground very fine at a mill situate in one of the buildings of the Works; and the whole is sifted to the state of powder before being put into the furnaces. When the mixed powder becomes heated, the coaly portion ignites at the surface; and when the mass begins to become liquid, a workman opens a door in the front of the furnace, introduces a rake or shovel, and turns the mass over, so as to expose a new surface uppermost. The door is again closed; the heat is allowed to act on the mass; and little jets of flame then begin to burst from it in every part. The workman next stirs and spreads the semi-fluid mass in every direction; and at length he removes it from the furnace. This is a very pretty operation — at least it may be regarded so by a by-stander, although it is rather a warm one to the workman himself. A low four-wheeled iron carriage is wheeled to the front of the furnace; on this carriage a shallow tray is placed, and into this tray the workman draws the semi-fluid mass from the furnace, by means of a kind of rake introduced at the door of the furnace. Shortly after the mass has fallen into the carriage, innumerable little jets of flame, called by the workmen 'candles,' burst out at its surface, and present a curious miniature illumination. The room or building in which this operation is carried on is rather a large one, and is, as may be supposed, somewhat highly heated.

The semi-fluid mass solidifies in the iron tray, and comes out as a square mass, measuring about three feet square by one in thickness. This is called ball-soda, or crude soda, or British barilla, and is the result of a curious series of chemical changes. The matters put into the furnace were coal, lime, and sulphate of soda; and these elements become so mingled and transferred by heat, that they appear, in the ball-soda, chiefly as carbonate of soda and sulphuret of calcium.

Next ensues the separation of the two ingredients just named: the former valuable, and indeed the object of the whole operation; the latter valueless, up to the present time. The ball-soda is put into an oval tank, and covered with water, which is allowed to act on it for a considerable time, as a means of dissolving the carbonate of soda. The liquor is drawn off at the bottom, and more applied; and so on until all the carbonate has been dissolved. The point here aimed at is to dissolve all the carbonate and none of the sulphuret, for the latter would spoil the former. When this is accomplished, the liquor containing the dissolved carbonate is placed in an evaporating furnace, where, by the application of heat at the surface of the liquid, all the watery part is caused to evaporate; and the solid which remains is chiefly carbonate of soda, with a very small admixture of sulphur. By a further exposure to the heat of a furnace, this sulphur is driven off; and there remains a yellowish earthy substance, which is the common soda-ash or soda-salt, employed extensively in various manufactures. It contains about fifty per cent. of pure soda.

One more stage of improvement occurs before the soda is finally completed. For some purposes this earthy carbonate of soda will not suffice: it must be in a crystallized form; and to effect this crystallization another series of buildings, of processes, and of vessels is necessary. The soda-ash is again dissolved in water, again allowed to settle, and then boiled to a certain degree of consistency. Next ensues the crystallization, which is one of the most striking features in the Works. In a very large and cool building are upwards of a hundred hemispherical cast-iron vessels, from five to ten feet in diameter. In these the liquor is placed, after having deposited its solid impurities: and here it remains until all that will crystallize has done so. It is a beautiful sight to see the large crystals radiating from the sides of the vessels towards the centre, and absorbing, as it were, into their substance more and more of the liquor, until only a little of this latter remains. After several days, the crystals are broken out from the vessels, to be packed in barrels for the market; while the remaining liquid, called the 'mother-liquor,'

by a further process of evaporation yields a very coarse kind of soda, fitted for some manufacturing purposes, —thus adding one more to the forms in which soda is presented by this interesting chain of processes.



[Soda-crystallizing Pans.]

One thing has yet to be noticed. What becomes of the solid impurities which occur in the process? This is one of the difficulties to which a chemical manufacturer is exposed. The sulphuret of calcium, the solid and useless ingredient in the ball-soda, is a veritable source of trouble and expense. No profitable mode of applying it has yet been introduced: it cannot be melted and washed away, or heated and burned away; nor must it be thrown into the river. The result is exhibited by what has taken place at the Felling Works. Here, between the Works and the river, an enormous heap of 'waste' has accumulated, covering an area five or six acres in extent, and mounting to a height of thirty or forty feet. Day by day is this heap increasing in extent; and we believe that more land has lately had to be purchased, to form a resting-place for heaps yet to accumulate. The earthen waste is not thrown here heedlessly: it is laid in a compact form, having a smooth and level surface at the top; and if the memory of present things were to pass away, future geologists might be puzzled to conjecture how such a mound got there. Not only the sulphuret of calcium from the soda process, but silica and ashes from other processes help to swell this heap.

Another process carried on in these Works, and to which we may next direct our attention, is the manufacture of *chlorine* and of *bleaching-powder*; those two wonderful agents which have wrought such improvements in bleaching. Bleaching-powder is chemically called chloride of lime; but its most marked property has given it the former distinctive name.

Here we have another example of the influence which legislative matters exert upon chemical manufactures. If the duty had not been taken off common salt, it may be safely averred that the manufacture of these articles would not have reached its present height. Salt not only yields soda from one of its constituents, and muriatic acid from the other, but this acid itself is made to yield chlorine, by separating hydrogen from it. Chlorine is a gas, and as such is not in a convenient form for sale and commercial transit; but by causing it to be absorbed by any dry and cheap substance, such as lime, it can be brought into a convenient form. Such is the case in practice. Chloride of lime is now used to an immense extent in different branches of manufacture, the lime being merely a vehicle for containing the chlorine, and all the remarkable chemical effect being due to the

Chlorine requires for its production or evolution a degree of care in the choice of vessels, analogous to that exhibited in so many other branches of chemical manufacture. In one of the buildings at the Works are a series of vessels made of stone contained within iron vessels; and into the innermost vessels are put the necessary ingredients. These are muriatic acid and oxide of manganese. Steam is admitted between the inner and outer vessels, by which the mixture is raised to the required temperature; and by the mutual action of the chemical ingredients they become so altered in their combinations as to produce muriate of manganese, water, and chlorine gas, the last named of which is the object of the manufacture. In this process, and in the subsequent one of causing the chlorine to be absorbed by lime, the most scrupulous precautions are taken to prevent the escape of any of the gas into the open air; since it is so deadly a poison, that the inhalation of a very small portion of it would suffice to take away life. Some years ago, when the muriatic acid gas was allowed to go to waste up the chimneys of sulphuric acid works, chlorine was produced from sulphuric acid, salt, and the oxide of manganese; but the muriatic acid is now economically used instead of the sulphuric acid and the salt—thus at once cheapening the product and saving the atmosphere from contamination.

The mode of impregnating lime with the gas is very curious. A chamber is fitted up in the most completely air-tight manner, with a few openings carefully secured. On shelves in this chamber is deposited slaked lime in powder, spread out so as to allow the chlorine to act upon it. The gas, as it escapes from the vessels, flows through a pipe into this chamber, which it gradually fills; and as soon as it comes in contact with the lime, the two substances unite, forming chloride of lime, by which the whole of the gaseous element is absorbed.

This powerful agent is in a most convenient form for manufactures. When the chloride of lime is immersed in water, it dissolves, and the water becomes impregnated with the chlorine, which then forms the bleaching-liquid now so largely used in the manufacturing districts. About a century ago our manufacturers of linen used to send their cloths to Holland to be bleached, where they were steeped in potash ley, then washed, then steeped in buttermilk, and then laid out on the grass for several months; so that the linen was thus out of the maker's hands for seven or eight months before he could bring it into the market. A process very similar next became established in this country; the goods being still several months under process of bleaching, but the transference to and from Holland being no longer necessary. Next sprang up an improvement by the substitution of sulphuric acid for milk, whereby the same effect was wrought in one day which before occupied six weeks, and brought the whole bleaching process within a period of three or four months. Next ensued the discovery that a particular gas, evolved by the action of manganese on muriatic acid, had the power of destroying vegetable colours, or of bleaching; and about sixty years ago, Bertholet practically applied this new gas (chlorine) in bleaching. Next followed the introduction of this method into England and Scotland, and the institution of experiments for facilitating the use of the gas in bleaching establishments. If used as a gas, the effects were highly deleterious to the workmen; if absorbed by water, the water gave out a very offensive odour. Potash was added to the chlorine water, to remove the smell; next, the cloth was passed through lime-water previously to the application of the chlorine; and next, Mr. Tennant, of Glasgow, contrived the means of making a liquid chloride of lime, which was the open-

ing to a field of vast importance. One more step was the devising a mode of producing a *dry* chloride of lime which should be capable of being easily packed in barrels, which should retain all the bleaching properties of the chlorine without its offensive odour, and which should be procurable at a cheap rate. This has been done; and the chloride of lime of modern times is presented to us as one of the most successful instances of chemical science applied to manufactures. Instead of eight months, a period of a few hours only is now necessary for the process of bleaching. Dr. Thomson states, "A bleacher in Lancashire received fourteen hundred pieces of grey muslin on a Tuesday, which on the Thursday immediately following were returned bleached to the manufacturer, at the distance of sixteen miles, and they were packed up and sent off on that very day to a foreign market. The quick return of capital which is thus made is a benefit entirely to be ascribed to the new mode of bleaching." The mode of bleaching with this invaluable agent has been described in the Supplement for July, 1843.

We have yet to glance through that department of the Felling Chemical-Works which is appropriated to the production of artificial alum, a process scarcely less beautiful in a chemical point of view than those which have already engaged our attention.

In a notice of the alum-works at Hurlet, in Scotland, at p. 421 of last year's volume, we explained that the common alum is there produced from an ore found in exhausted coal-pits: an ore containing sulphur and alumina, two of the constituents of alum. It was also intimated that a mode is sometimes adopted of making alum artificially, without having recourse to any kind of alum-ore or alum-stone. Now it is this latter mode of proceeding which is followed at Felling. Crystallized alum is called chemically a 'sulphate of alumina and potash;' being composed of sulphuric acid, alumina or pure clay, and potash; and provided those three agents can be properly brought together in proper proportions, they will still form alum, whether derived from decomposed ore or from the mixture of the different agents.

The buildings appropriated to the alum manufacture have their own vessels and their own peculiar arrangements, some of them very interesting. The alumina is procured from Cornish clay, a fine, smooth, and white clay, which is extensively employed in the manufacture of porcelain and the finer kinds of pottery. This clay is brought from Cornwall in balls or blocks, as dug out of the earth, and is ground under a heavy stone to a state of great fineness. The powdered clay is next calcined in an appropriate oven, to drive off the moisture and vegetable matter which may be combined with it. The calcined clay is next placed in an oval tank sunk in the ground; and to this is added the second ingredient necessary to form alum—that is, sulphuric acid. The acid has such a powerful action on the clay, that the two together soon form a boiling mixture, although no heat whatever is applied to it; the instance being one of those in which rapid chemical combination gives rise to the evolution of heat.

When these two agents have combined, they are mixed with a considerable quantity of water, and allowed to settle, by which those solid parts of the clay which resist the action of the acid are allowed to fall to the bottom of the vessel. The liquid (which is a solution of sulphate of alumina) is then pumped up into leaden vessels, where it receives the addition of some sulphate of potash, as a means of giving the third ingredient necessary to the formation of crystallized alum. The different ingredients are allowed to remain quiet in a circular sunk vessel, where the alum gradually crystallizes round the sides, shooting forth large crystals towards the centre, where the mother-liquor (or portion which will not crystallize) remains.

But the alum thus produced is not pure and fine in quality. It undergoes the process of *roaching*, to bring it to a better condition. This roaching (or roching, as it may perhaps more properly be spelled) is probably meant to imply the production of an alum similar to roch-alum; and this latter derived its name from Roccha in Syria, where it was first made. In the process of roching, steam is allowed to act upon the alum, so as to dissolve it, and to make with it a very strong solution. This is done in a leaden vessel; and from this vessel the solution is transferred to large cylindrical crystallizing vessels, where it attains the final state in which it is sent to market.

When the crystallization is complete, the cylindrical vessels present a very beautiful exemplification of this kind of chemical action. They are about seven feet



[Cylindrical Mass of Crystallized Alum.]

high by five in diameter; and upon looking in at the top of any one of them, we see a thick hollow cylinder of crystallized alum, with a portion of floating water in the centre: the mass appears like an irregular rock-work of sparkling transparent crystals, many of them of large dimensions, and all with the most perfect symmetry of form, presenting the keen apex, the fine, clear, straight edges, and the regular and even faces of the 'octohedron,' the geometrical form which these crystals assume. The manner, too, in which the alum is extracted from the vessels is calculated to show the beauty of the crystallization. The vessels are capable of being taken to pieces as they stand, by the removal of certain hoops and staves; and the alum is then exhibited to the eye as if it were one magnificent cylindrical crystal, as large as the interior of the vessel had been. The liquor is removed from the inside, and the alum, being broken up into convenient fragments, is packed in barrels for the market.

There is one peculiarity about alum which has led to an entirely new branch of manufacture, now being carried on extensively at the Felling Works. We have said that it is a sulphate of alumina and potash. But it is not necessarily so: in some instances soda, in others ammonia, has been used instead of potash.

The truth is, that these ingredients are used chiefly as agents to induce the crystallization of the alum. Sulphate of alumina will not crystallize; the sulphuric acid and the alumina have combined, and the resulting compound possesses most of the useful properties of alum; but it cannot, by itself, be brought into a crystalline form. When, however, any one of the three above-mentioned alkalis is added, the sulphate acquires this power, and becomes a crystallized sulphate of alumina and potash. On the other hand, this potash is of no practical service in the chief purposes to which alum is applied in the arts: the sulphate of alumina is the real working agent; and if this could be obtained in a pure state and in a solid form, the potash would in most cases be unnecessary. It happens that the iron contained in small quantity in the clay, and which would injure the alum if allowed to form one of its constituents, is with difficulty removed except by some mode of crystallizing the alum; and it is not until recently that the difficulty has been practically removed. There is a 'patent alum' now made (the patent for which is, we believe, in the hands of the proprietors of the Felling Works), the chief characteristic of which is, that it possesses the efficient properties of alum, but without containing potash.

In making this alum, sulphuric acid and Cornish clay are used, as in the other case; but the clay is used in greater proportion, so as to form a kind of mortar or thick paste. This mortar is placed in a heated trough, where the moisture is so far evaporated as to convert the mass to the form of a dry earth. From the trough it is removed to tanks, where water is employed to dissolve it; and while in the liquid state the composition is acted upon by an agent intended to remove the iron: this being the only contained ingredient which is injurious to the alum. The agent employed attracts or combines with the iron existing in the clay, forming with it the coloured pigment known as Prussian blue. This Prussian blue is allowed to subside, and the remaining liquor, being a solution of sulphate of alumina, is boiled till all the water is driven off. The solid residue is formed into cakes an inch or two in thickness, and in this form it comes into the market. Instead of being a crystal, it is an opaque earthy solid, differing from common alum in the circumstance of containing no potash, but possessing in common with it the qualities which render it valuable in the arts.

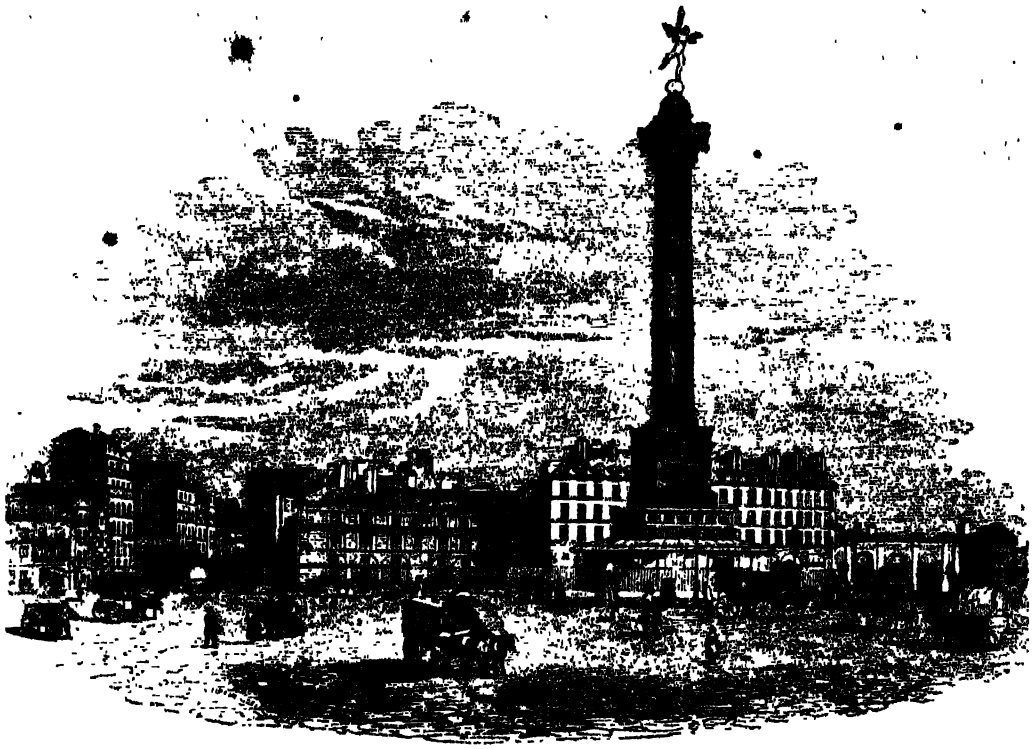
The Prussian blue is procured in far too large quantity to be allowed to remain in that state: it is restored again, by chemical means, to the form which it before presented, ready to be again used in making more alum. This principle is exhibited in many departments of a chemical work: where a chemical substance, after being modified in its character by the aid it has afforded in making other substances, is restored to its original form, and thereby fitted to render similar aid in other instances.

We have now noticed the chief manufacturing processes carried on at the Works under consideration. They involve, as may readily be supposed, a very extensive variety and arrangement of buildings, subsidiary to the actual operations carried on. For instance, there are five steam-engines in different parts of the Works, for pumping up water, pumping liquids from one vessel to another, setting in motion the mills and stones for grinding clay and lime, and other operations requiring great motive power. There are carpenters' shops, smiths' shops, cooper shops, plumbers' shops, and others of a similar kind for keeping in working order the various vessels employed in the Works; the lead vessels and pipes, especially, are so numerous, that there is constant work for plumbers in one way or other. There is also an important department which we may perhaps term the very grammar of the whole, viz. the *laboratory*, the spot wherein are determined the numerous points connected with the chemical science of the manufactures. This laboratory contains all the appliances for such a purpose—air-furnaces, reverberatory furnaces, sand-baths, stills, retorts, and the varied apparatus for experimental trials on the mutual action of chemical agents. A chemical library, too, is a necessary appendage to such a place.

When, leaving the actual buildings themselves, we go out upon the spoil-bank or mound of rubbish, we there get a bird's-eye view of the arrangements whereby the Works are connected with the river Tyne. Railways traverse the ground in all directions, affording easy means of communication. In the first place the coarse materials, such as sulphur, salt, lime, coal, &c., are landed at a wharf on the south bank of the river; and are thence hauled up an inclined railway, through a tunnel, to the Works, by means of steam-power; and when arrived there, other railways convey these materials to the various buildings wherein they are to be brought to bear upon the manufactures. Then, when the manufactured goods are finished, the same system of railways furnishes a medium for conveying them down to the river, there to be shipped off to various quarters. Among all the busy rivers of England, the Tyne is in this way one of the busiest. At short intervals along both of its banks, for a distance of many miles, there are similar outlets for the various manufactures produced. The Chemical Works, the Glass Works, the Potteries, and above all the Collieries, all have their wharf or their 'staith,' their railways or their inclines, for connecting the Works above with the river below. The Chemical Works, too, have their clusters of chimneys, their spoil-banks of waste, and their labyrinth of buildings, to add to the features of the scene.

Such are Chemical Works. Some manufacturers make one kind of acid or of alkali, some another; one firm may have a reputation for a particular kind of salt or chemical agent, another for another; and, to understand the minute details, it would be necessary to follow the manufacturing routine of all the substances one by one. But the broad principles are the same in all. There is in all of these Works the same exhibition of lofty chimneys, large and variously arranged buildings, furnaces and ovens in almost endless variety, boilers, heaters, coolers, stills, crystallizing vessels, cisterns, tanks, pans, and a multiplicity of other apparatus; while they all likewise agree more or less in this—that there is no lack of odours from some of the chemicals under process of manufacture. It is perhaps scarcely necessary to remark, that the shops of the chemists and druggists are supplied with drugs of these various kinds from the Chemical Works, through the agency of wholesale dealers. There are in London several wholesale druggists who accumulate in their warehouses the crude drugs from every part of the world, not only from the chemical manufacturers, but from foreign merchants and dealers; and these drugs, passing into the hands of the retailers, are by them sold in smaller quantities, or are made up into the various well-known pharmaceutical preparations.

We must, in conclusion, acknowledge the courteous liberality of the proprietors in affording facilities for preparing this sketch; and this is the more due, because Chemical Works are not, in general, so readily opened to strangers as those in which Metallurgic or Textile manufactures are carried on.



* Colonne de Juillet, Place de la Bastille

COLUMN OF JULY, PARIS.

This free and open space, on which the column given in the cut is erected, was once the site of a great state prison, in which, through four long centuries, any man might be immured for life at the will of the sovereign, or at the instigation of some powerful personage. When a prisoner was removed to the Bastille, no one could tell how long he might remain there. The period of his incarceration depended on chances, the smiles of a mistress or the frown of a court favourite. Many passed thirty years of their lives within its walls; and it is recorded of one prisoner that he was removed to Charenton, a lunatic asylum and a prison, after a confinement of fifty-five years and five months. Such an abuse of power as this has long ceased in England, and cannot now be exercised in France. It is not uninstructive to mark the means by which, in the two countries, the liberty of the subject has been secured from illegal imprisonment. In England this is effected by the Habeas Corpus Act, one of the great safeguards of the rights and freedom of Englishmen. The purport of the great writ of Habeas Corpus is a command by the courts of common law at Westminster to the person who detains another to produce the body of such a prisoner, and to state the day and the cause of his caption, and further to submit to and receive whatsoever the judge or court awarding the writ shall direct. At a time when even villeinage was not extinct in England, the old writ *de homine replegiando* could be resorted to in order to deliver a man out of custody, by giving security to the sheriff that the person detained should be forthcoming to answer any charge against him. The great mass of the cases arising out of the issuing of these writs in the old law books relate to the seizure and detention of persons whom the parties seizing claimed as their villeins or serfs. But the writ was liable to be made use of as a means of evading justice, and hence the privileges which it conferred were not easily to be obtained, as the legal proceedings were naturally surrounded with many difficulties. In cases where the crown was concerned, this writ was also an insufficient remedy. In the reign of Charles I. the judges of the King's Bench decided that they could not bail or deliver a prisoner committed without any cause assigned in cases where he was committed by the special command of the king or by the lords of the privy council. Not without a struggle with the court and the judges did the parliament extort an act, in 1641, which enacted that by whomsoever a person might be committed, the courts of King's Bench or Common Pleas should, within three days after a writ of Habeas Corpus, examine and determine the legality of a committal. Still attempts were made to fetter the right, when, in 1680, another act was passed, which is more particularly known as the Habeas Corpus Act, and is frequently spoken of as another Magna Charta. This act points out plainly the method in which the writ is obtained. There have been periods of alleged danger when the Habeas Corpus Act has been suspended; but, as it is observed in the article 'Habeas Corpus' in the 'Penny Cyclopædia,' from which we have taken the preceding details, "these are in fact the very times when the statute is most necessary. The Habeas Corpus is the protection only of the innocent, not the defence of the guilty." It has been customary to pass an act of indemnity after such suspensions of the act, for the protection of those who have acted during the suspension.

The capture of the Bastille by the Parisians, on the 14th of July, 1789, from which day the Revolution may truly be said to have commenced, led to the speedy abolition of the despotism which had filled the build-

ing with so many victims; and finally, after years of blood and terror, of anarchy and the supremacy of the sword, the liberties of the French people appeared to be established on a firm basis. But the last Bourbon kings, like our own Stuarts, were an infatuated race; and on Sunday, July 25th, 1830, the 'Moniteur Universel,' the official journal of all the French governments for the last half-century, published six ordinances, which, if they had not been successfully resisted, would have deservedly abased the French people in the eyes of every free nation. The first declared that no journal or work of less than twenty sheets of letter-press should appear without the royal permission granted both to the writers and printers; and this permission was to be renewed every three months, and might be revoked at pleasure. The second ordinance annulled the elections of members of the Chamber of Deputies which had just taken place, and which had not yet met. The third abrogated the rights of the electoral body, disfranchising three-fourths of the former constituency, and reducing the number of members of the Chamber from 430 to 258; besides making other innovations, all of which had a despotic tendency. The fourth ordinance merely convoked the electoral colleges; and the remaining two nominated to the dignity of councillors of state a number of the most unpopular men in France, men who had been inimical to, and were incapable of comprehending, the spirit of a constitutional government.

In the Three Days of July the people of Paris fought with a spirit which proved that they were not unworthy of the liberties of which so audacious an attempt had been made to deprive them. The events of these days, as given in the 'Library of Entertaining Knowledge,' are so well known that it is not necessary to enter into any details concerning them. The number of citizens killed was 788, and the number of wounded 4500, according to an official report of the Committee of National Rewards. Eighty-five persons were interred in front of the Louvre, and seventy in the Marché des Innocens; and others, though not in so large a number together, in several other parts of the capital. The ashes of five hundred and four of these patriots, removed from other places, now repose beneath the Column of July, which serves at once as a mausoleum and a monument of their devotion.

The Place de la Bastille, which witnessed the first combats of the first revolution, is in every respect an appropriate site for a memorial of the triumphs of the second. The Fountain of the Elephant, of which a design and an account appeared in No. 93 of the 'Penny Magazine,' was never executed; and the pedestal of the Column of July is erected on a portion of the work intended for the Fountain. The basement is of white marble, supported by blocks of granite; and on one side of the pedestal is a figure of a lion passant in very bold relief, and underneath is an inscription, of which the following is a translation:—

TO THE GLORY OF FRENCH CITIZENS WHO ARMED AND FOUGHT FOR THE DEFENCE OF THE PUBLIC LIBERTIES ON THE MEMORABLE DAYS OF JULY 27, 28, AND 29, 1830.

At each angle of the pedestal is a figure of the Gallic eagle, bearing a wreath of oak in its claws. The shaft of the pillar consists of metallic cylinders, partly fluted and partly enriched with bands bearing lions' heads, and their mouths form apertures for the admission of light and air to the staircase in the interior of the column. The spaces into which these bands divide the column are filled with the names of five hundred and four combatants who were killed during the three days. In the new edition of Galignani's 'Picture of Paris,' published during the present month, it is said that the Corinthian capital, over which is a railed gallery, is the largest piece of bronze ever cast, being sixteen feet and a half wide. It is ornamented with lions' heads, and figures of children bearing garlands. A gilt globe surmounts the capital, on which stands a colossal figure, also gilt, representing the genius of liberty, on tiptoe, as if in the act of taking flight, with a torch in his right hand, and in his left a broken chain. The Parisians tell us that the attitude of the figure is significant of the propagandism of French political ideas; but it might also mean that liberty was on the point of deserting the fort-encinctured capital of France. The column is of the Composite order, and is about 163 feet high (being 39 feet less than the London Monument), with a diameter of 12 feet. The cost of the whole work was 48,000*l.*, and the weight of metal used was above 725 tons. The staircase in the interior, by which an ascent may be made to the top, is suspended on a new principle, and vibrates with every blast of wind. The view from the top is very interesting. Within the marble pedestal there is a circular corridor, paved with white marble, relieved with stars and crosses of black marble, and lighted by windows of stained glass; and the descent of a few steps leads to the funereal vaults, which are closed by four cast iron doors, richly ornamented with tracery. Each vault contains a sarcophagus, fourteen yards in length, one in width, and one deep, in which the remains of the bodies have been deposited. The enclosure around the pedestal is flagged with white marble. The column was 'inaugurated' in July, 1840.

FLORENCE AND THE MEDICI FAMILY.

THE country in which the city of Florence, or Firenze, as the Italians call it, is situated, is of the most varied character and exceedingly beautiful. It is fifty miles from the sea, in the valley of the Arno. A fine plain to the north-west extends to the very feet of the Apennines, which rise, with their belts of blue pine forest, to the height of three thousand feet. The view on the other sides is bounded by mountains clothed with woods of chestnut and groves of olives, and studded, as far as the eye can reach, with country residences and beautiful villas. Many of the hills are crowned with majestic ruins. The hill on the summit of which the ancient town of Fiesole stands almost touches the city walls. The fields in the low lands are highly cultivated, and are divided by vines, from which, in the autumn, the grapes are seen hanging in luxuriant festoons. Florence itself, with the broad river flowing through it, is as beautiful at first sight as it is interesting from its associations. It is surrounded by walls, but within the enclosure are many gardens, and on the southern declivity there is a large public promenade planted with trees. The river is crossed by four bridges, one of which, the Ponte Santa Trinità, is adorned with marble statues. Its great domed cathedral and its churches are profusely enriched with sculptures and paintings, and contain the monuments and mortal remains of the famous artists, "heirs of all time," who constructed and embellished them. It has many squares and beautiful fountains. Its old massive fortress-like palaces rise here and there with a sort of stern grandeur, and its galleries of sculptures, paintings, gems, and medals are among the finest in Europe. With such natural advantages and such embellishments of art, it is not to be wondered at that Florence is much resorted to, and is considered the most delightful residence in Italy.

Florence was founded in the time of the Romans, by whom the town was called Florentia and the inhabitants Florentini. It seems to have been more fortunate than most of the other Italian towns in escaping the ravages of the barbarian conquerors of Italy. By

yielding to the dominant powers and looking only to their own preservation, the Florentines kept their town and surrounding territory entire and themselves at peace. The taking of Fiesole in 1010 is almost the only fact on record of their indulgence in the spirit of aggression and aggrandizement. A municipal government had been instituted by direction of Charlemagne, and they were governed by an officer called at first a duke and afterwards a count. On the death of the Countess Matilda about 1115, Florence became the inheritance of the see of Rome, and then began to govern itself as an independent commonwealth. The Florentines seem to have been industrious, prosperous, and generally quiet till the powerful families of Buondelmonti and Uberti, Amidei and Donati quarrelled with each other, and divided the city into factions; and soon afterwards, at the beginning of the thirteenth century, in the reign of Frederic II., emperor of Germany and king of Naples, the inhabitants of Florence became involved in the great feud of the Guelphs and Ghibelines. There were several families in Florence belonging to the class of nobility, and many families of rich citizens. Some joined the Ghibeline faction, some the Guelph, and after much contention the Guelphs were driven out of the city. On the death of Frederic in 1250 the Guelphs were allowed to return, and the Florentines then formed their first regular constitution. Their government fluctuated for some time between the aristocratic influence and the popular, but settled into a popular form, when its political and civil institutions were founded on the broadest basis of democracy. The city was divided into wards and the people were divided into trades, a master being appointed over each trade to administer justice to all within his ward. The trades were at first twelve, seven greater and five inferior, but the inferior were afterwards increased to fourteen, which made the whole number twenty-one. They were all provided with arms, and regularly trained and disciplined. Each company had its gonfalone, or standard, and its gonfaloniere, or standard-bearer, under whom they mustered. A gonfaloniere di justizia was selected from among the class of citizens, who held office for two months, and was for the time being at the head of the government. There was a council of citizens, generally of eight or ten, called priori, who, with the gonfaloniere, constituted the effective government of the state; and there were other councils, sometimes permanent and superintendent, called buoni huomini, and sometimes a delegated power was given to certain members for special purposes, which was called a balia. The constitution was frequently changed, but always retained its democratic character, and nearly the form above stated.

The history of the world does not afford another such instance of dissensions between rival families, of factious contests, of popular brawls and tumults, and civil bloodshed, occurring within the walls of a single city, and continued for centuries almost uninterruptedly, as the city of Florence. First there were disputes of the nobles with each other, then of the nobility with the citizens, and, after the nobles were overcome, of the citizens with the populace. The animosity was generally of the most violent character, the parties fighting with each other from street to street and from tower to tower, and was frequently accompanied with acts of such atrocious cruelty, perpetrated under the excitement of extreme rage, as are hardly credible. Banishment, dispersion of families, and death, occurred to an extent unknown in any other city. Yet notwithstanding the interruption of trade and the loss of life which these scenes, as well as the frequent wars of the Florentines with the other Italian powers, occasioned, such is the stimulus of free institutions, that Florence, though a small republic compared with some of the other Italian states, had, as early as the year 1300, advanced to a condition of great abundance in riches, inhabitants, and reputation, with three thousand citizens armed and trained within its walls, and seventy thousand more within its territory. It rapidly advanced during the next two centuries, and became not only the chief city of Tuscany, but one of the most important and influential states of Italy. In literature and the fine arts it stood first, and was appropriately designated the Athens of Italy. Dante, Petrarch, and Boccaccio moulded the language, and stamped it with immortality. Architecture, sculpture, and painting, advanced with rival rapidity under Ghiberti, Giotto, Brunelleschi, Michel Angelo, and several others. The public buildings and galleries of Florence still exhibit abundant evidence of its rapid progress in the elegant arts, as the vast wealth of its great families, under whose encouragement those arts flourished, afforded proof of the industry of the people and the commercial skill and enterprise of its merchants.

Besides the family feuds to which we have already alluded, and those of the Cancellieri, when broken up into the two rival branches of the Bianchi and Neri, the citizens and populace were afterwards almost constantly involved in the disputes of other great families, such as those of the Albizi, the Medici, and the Pazzi.

In the later times of the republic, the Medici became the most distinguished of these rich and powerful families: in the earliest times they are not mentioned. They were not nobles, but belonged to the class of citizens. Giovanni de' Medici is mentioned as having in 1251 forced his way, with 100 Florentines, into the fortress of Scarparia, through the Milanese, who were then besieging it. Francesco de' Medici in 1348, Salvestro de' Medici in 1379, and after him his son Veri de' Medici, each held the office of gonfaloniere, or chief magistrate. But the chief founder of the greatness of the Medici family was Giovanni de' Medici, who was born in 1360, and who died in 1428, leaving two sons, Cosimo and Lorenzo. He had acquired vast wealth by commercial pursuits, and had filled all the higher offices of state with great reputation for solidity of judgment and prudent conduct.

Giovanni's eldest son Cosimo, who was born in 1389, became his heir, and consequently the head of the family. Cosimo was a man of extraordinary ability for business, and for some time managed the public affairs with such general applause as to raise the envy of the family of the Albizi. Rinaldo degli Albizi exerted himself in organizing a party in opposition to Cosimo: they succeeded in electing a gonfaloniere hostile to the Medici, and while Cosimo himself was absent at his country house, on purpose to avoid interfering in the factious contest, Rinaldo got up a charge against him, and when he came to the palace of justice to answer the charge, he was seized, condemned almost without the forms of justice, and imprisoned in one of the towers of the palace. Cosimo was in danger of being put to death, but his friends saved him by bribing Bernardo Guadagni, the gonfaloniere, and Mariotto Baldinetti, who had charge of him, and he was secretly conducted out of the city by night. The bribe was 1000 florins to Guadagni, and 800 to Baldinetti. He was received with great respect in the different Italian towns through which he passed, and when he arrived at Venice was treated as an ambassador would have been treated, and not as an exile, though a sentence of banishment for ten years had in the meantime been passed upon him by the priori of Florence. Rinaldo now assumed the management of the state, and soon made himself universally odious; the influence of the friends of Cosimo became paramount; Rinaldo was sentenced to

banishment, together with the rest of the Albizi and other families who had been in union with them; Cosimo was recalled, and on the 5th of October, 1434, exactly a year from the day on which he made his escape, he re-entered Florence, and was received with the most extravagant demonstrations of public joy. Thenceforth he was the most influential man in the state. Though in his private character he was nothing more than a merchant, and in his political character only a simple citizen, he was in fact Prince of Florence, and as such was written to and regarded by the other states of Europe. Ambassadors addressed themselves to him in the first instance, and his advice to the priori was received as the directions of a king to his council. Meantime he continued to extend his mercantile transactions with such skill and prudence as to accumulate enormous wealth, while his expenditure was on a scale of regal magnificence. In Florence he built the convent of San Marco, the church of San Lorenzo, and the monastery of San Verdiano; on the hill of Fiesole he built the church of San Girolamo and l'Abbatia; and in Mugello he restored the church of the Frati Minori from the foundation. He constructed several splendid chapels and altars in the churches of Florence. He also built at Jerusalem a hospital for the reception of poor and infirm pilgrims, which he maintained at great expense. Besides his palace in Florence, he built four other houses at Careggio, Fiesole, Cafaggiuolo, and Trebia, each suitable for the residence of a prince. He was munificent in his patronage of the fine arts and of classical literature. It was during the government of Cosimo that Brunelleschi raised the great dome of the cathedral at Florence, then unrivalled and perhaps not surpassed even now, and Ghiberti cast the massive bronze gates of the baptistery of San Giovanni, which contain a series of pictures in metal, and which Michel Angelo deemed worthy to be the gates of Paradise. He employed Donatello not only in works of sculpture, but in purchasing for him statues, vases, and other remains of Greek and Roman art, to decorate his palaces, and which now form a part of the Mediœan gallery. He spent large sums in the purchase of manuscripts of the Greek and Roman classics, and thus laid the foundation of the great Mediœan library, the Bibliotheca Mediceo-Laurentiano. His mercantile transactions and loans influenced the politics not only of Italy, but of other European states. When Naples and Venice leagued against Florence, Cosimo called in his debts from those places, and put an end to the war by drying up their resources. When Milan and France leagued against Venice, he supplied the Venetians with 'the sinews of war,' and her resistance was successful. His agents in England, during the wars of the houses of York and Lancaster, supplied Edward IV. with large sums, which success enabled him to repay. Notwithstanding the vast amount of income expended, it was found after his death, that besides the sums due to him from other Italian states and abroad, most of the great families of Florence were indebted to him in large amounts. With so vast a capital indeed, his accumulations from loans at interest must have been immense. In his private habits and deportment he was as moderate and simple as he was liberal and princely in his public expenditure. During the period of altogether about thirty-one years during which he augmented the resources and wielded the energies of Florence, he exercised the power of a sovereign by a sort of invisible agency, having no regal trappings, no kingly state, no train of attendants, no guards, but walking about in the ordinary attire of a respectable citizen.

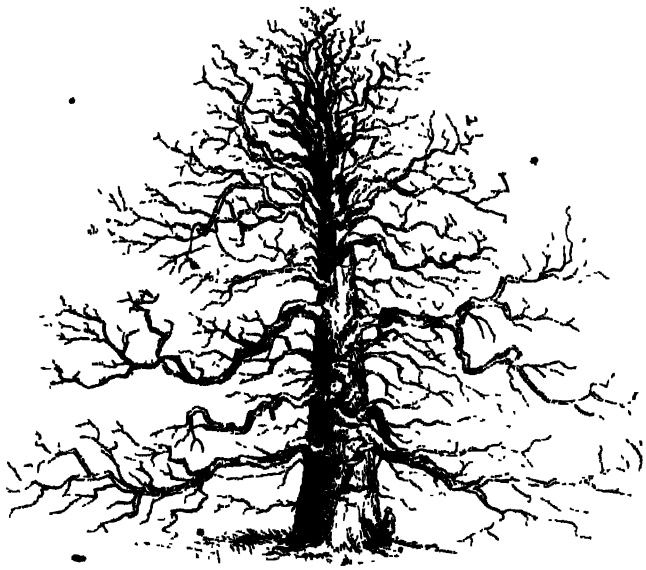
Cosimo de' Medici died August 1, 1464, at the age of [illegible] in full possession of his intellectual faculties. He died privately, according to his own direction, in the church of San Lorenzo, which Brunelleschi had built for him. The title of "Pater Patriæ," which had been bestowed upon him by a decree of the state, was inscribed on his tomb. In his person he was tall; in his youth he had been handsome; and in his age his contemporaries frequently refer with admiration to the venerable dignity of his appearance.

Cosimo's younger brother Lorenzo, who was born in 1394 and died in 1440, became the stock of that lateral branch of the house of Medici which in the 16th century obtained the absolute sovereignty of Tuscany.

Cosimo left two legitimate sons, Giovanni and Piero, and one illegitimate son, Carlo, who was liberally educated, and lived respectably. Giovanni, the eldest son, died Nov. 1, 1463. Piero consequently succeeded to Cosimo's property and authority, in Florence. He was a man of judgment and prudence, but of infirm constitution, and died Dec. 2, 1469, in his 53rd year. He left two sons, Lorenzo and Giuliano, and two daughters.

Lorenzo de' Medici became the head of the Medici family and of the state of Florence. He was a man of still greater abilities than his grandfather, and is indeed one of the most extraordinary public characters on the records of history. To him we shall devote a separate article in a following number.

A trading Town of Eastern Africa.—At Berbera, for example, throughout a considerable portion of the year, the traveller who chances to land or arrive there discovers nothing but some eighteen hundred or two thousand empty huts, between which the prowling hyenas or jackals in troops scour and howl by night. Man seems to have abandoned the place for ever. The port is as destitute of shipping as the town of inhabitants. On a certain day, however, fixed and known to the disciples of trade, a few white sails appear in the offing approaching the desolate and deserted shore; and on land, probably at an equal distance, clouds of dust spreading and surging up into the atmosphere, announce the approach of what might easily be mistaken for an army. Long strings of camels, mules, and asses, heavily laden, and escorted by warriors on horseback, with match-lock, lance, and shield, emerge from beneath these clouds and make towards the silent streets. In a few minutes doors fly open, tents are pitched, fires are kindled, life of every kind abounds, and Berbera is transformed into a populous city. And what a population! There is scarcely perhaps a single people or tribe dwelling within a thousand miles of the spot which has not its commercial representative at Berbera. There you behold the Banian from India peering forth cunningly between piles of rich goods; the Persian, with shawls from Kermân and turquoises from the neighbourhood of the Caspian Sea; the natives of Mesopotamia, and Oman, and Hadramaut, and Yemen, and the Hejaz, with whatever commodities the soil of Arabia produces; the Egyptian, the Nubian, the Abyssinian, the Dankali, the natives of Suza, Enaria, Kaffa, Kambat, and Zingero; the Hurruri, the Isah, and the Somauli, all surrounded by the productions and merchandise of their respective countries. The whole of this multitudinous assemblage, brought together and pervaded by the spirit of gain, is engaged from morning till night in excessive turmoil and wrangling. Honesty, moreover, is a rare visitor among them. Each endeavours to overreach the other, high words arise, quarrels spring up, blows are given and returned, lances flourished and creeses drawn, and here and there a pool of Musselman or Pagan blood tells of the way in which bargains are sometimes concluded by these rough customers. All the dialects and idioms of Babel pass current there, each man screaming at the top of his voice in order to make himself heard amid the indescribable din, created partly by human tongues, partly by the neighing of horses, the strange grunting of the camel, the bellowing of oxen, and the braying of asses. Dogs, too, of every size and species, lean, hungry, savage, and without masters, prowl about the purlieus of the mart in search of offal, howling and barking to augment the concord of sweet sounds that denotes the whereabouts of the devotees of commerce.—*Foreign Quarterly Review, No.* 65.



[Panshanger Oak.]

RAMBLES FROM RAILWAYS.

The Lea.—No. II.

By this time the Lea has become a river of tolerable size, and from Hatfield Park to Hertford is much more beautiful than in the earlier part of its course; and it increases in beauty till it enters the latter town. The grounds on either side are hilly and well wooded, and handsome houses, rustic cottages, with ever and anon a distant spire peeping from among the trees relieve the way from everything like monotony.

A short distance before we reach Hertford the Lea is joined by the river Maran, a lovely little stream, which has its source a few miles from King's Walden. About two miles before its union with the Lea it passes through Panshanger Park, whither we will retrace it. Panshanger is not near so large as Hatfield Park, but from the greater variety of surface much more beautiful. Indeed there is so much that is attractive about it, and altogether it is so delightful a spot for a day's visit from London, that we shall extend our notice of it a little beyond our usual limit.

Panshanger belongs to the Earl Cowper, who, with a liberality deserving grateful notice, permits the most free access not only to his park and grounds, but to his picture gallery, and both contain more than enough to repay a pilgrimage. Before we enter the gallery let us saunter awhile along these slopes, and among these groups of lofty and picturesque trees, and then beside the flowery banks of that clear, bright, and rapid little stream, and watch its silvery tenants poising themselves against the current, or darting briskly after some luckless insect. A brief converse with the works of nature will form no unfit preparation of the mind for an enjoyment of those works of man we are about to examine. There is a rich and varied succession of views all over the park, but the main attraction is the famous oak. This is a most majestic tree, surpassed perhaps in size by many, but equalled in beauty by none. At least we never saw, nor remember to have heard of, any that can be compared with it. It stands alone in a 'bottom,' in the private garden, and its wide branches spread out unobstructedly in every direction. According to Arthur Young, in his 'Survey of Herts,' it was called the *Great Oak* in 1709. Strutt, in his 'Sylva Britannica,' fol. 1822, says it contains one thousand feet of timber, and is nineteen feet in circumference at a yard from the ground. The trunk rises from its roots with a graceful curve, and the main branches separate from it in a regular yet varied and free manner, such as to render it quite a model of form as an oak. Its remarkable symmetry causes it, as is the case in a fine statue, or well-proportioned architectural edifice, to appear smaller than it really is. All who see it express surprise at its largeness when they stand beside its trunk. When clothed in the full luxuriance of its foliage nothing in the shape of a tree can surpass the harmonious grandeur of its appearance. Even when denuded of its leaves it is a noble object; in some respects more noble than before. We give an engraving of it in this state; it is represented in full leaf by Strutt, in the work before referred to, and by Loudon, in his 'Arboretum Britannicum;' in neither instance has there been anything like justice done to it. Indeed Loudon's engraving is merely a reduced copy of that in Strutt.

The gardens are tastefully laid out; there are too some pleasant terraces, and some of those walks (or alleys) bounded by tall evergreens, such as we read of in old books and see in the paintings of Watteau and Lancret. We need not stay to notice the external appearance of the house. It is one of those heterogeneous jumbles well named 'Modern Gothic.' The interior is designed with much more judgment. But we must turn to the Picture Gallery, as there are works there that will need all the time we can devote to them:—the productions of Raphael and Bartolomeo are not to be understood at a hasty glance. The Gallery is a noble room, well lighted by two or three lanthorns, and also by a large bay-window that looks over a richly cultivated scene. The walls are hung with a bright scarlet cloth, which, with the gilt cornices and other ornaments, and the rich furniture of the room, have a brilliant effect—too brilliant indeed for the sober character of the pictures, which would better accord with a more sombre tone of colour in the fittings. The ante-room through which we pass into the Gallery is chiefly hung with family portraits; among others is that of the celebrated Chancellor Cowper, who looks as if the cares of the state sat lightly on him.

Immediately opposite to us, as we enter the Gallery, is the gem of the collection—'The Holy Family,' by Fra. Bartolomeo. The figures are seated under the

shade of a palm tree, and are well drawn and skilfully arranged. Dr. Waagen, in his 'Works of Art and Artists in England,' says, "It is the most beautiful picture that I am acquainted with by this friend of Raphael. . . . The colouring is of extraordinary depth and warmth, even for the Friar." Whatever may be thought of the Doctor's judgment as regards the higher requisites of art, few will dispute his thorough knowledge of all that concerns the conventional excellencies of a picture: he is essentially a 'gallery-bred judge,' as he has been termed by that strange writer, the author of 'Modern Painters,' and we may safely trust his opinion, that this is one of the very finest of the Friar's pictures. But, after all, its main excellence arises from the earnest devotional feeling that so eminently characterises it. There is no striving after strong contrasts or glaring effects. The colouring is of a rich though subdued brilliancy; but it is not in any degree, as we sometimes see even in the colouring of Correggio, destructive of the religious seriousness of the work. It is a work of lofty character, but must, perhaps, be turned to again and again before its full grandeur is appreciated.

The next grand attraction of the place—to us we confess it is the chief—is a 'Madonna and Child,' by Raphael, which hangs just by the Bartolomeo. It is not a very large picture; the child is not an entirely agreeable one, but the mother is one of the most exquisite realizations of female purity and delicacy we ever saw. Her head is bent forward, and there is a slightly pensive look in her eyes which are regarding with an intense earnestness the child on her lap; and yet there is a vacancy in them as if they see not what they are fixed upon. Her thoughts are upon the child, but she is thinking also of His wondrous birth and of all those portentous predictions she has heard concerning Him. Though the present dwells in her mind, the past and the future—indistinct and unrecognized it may be—are mingling in it too. Raphael may not have thought thus when his hand traced that form—it may not have been in his mind when it conceived that image—yet he must be dull indeed who cannot discover this, or more, as it is there palpably embodied. Even Raphael never surpassed the almost ideal perfection of all that is pure and lovely in expression in this face. Yet it does not 'strike' at a glance. It requires a repeated examination to enter into the full extent of its meaning: and we have heard no mean judges speak of it disparagingly. To see how far Raphael surpassed every other painter in imparting to his female faces a holy elevation of character and at the same time preserving all their loveliness, we need but cross the room to a 'Head of the Virgin,' by Correggio, which hangs nearly opposite, and which it is said Sir Joshua Reynolds lingered over for hours when he first saw it, and returned to repeatedly before he would quite leave it. Admirable as this picture is as regards colour, &c. there is a want of dignity, and also of delicacy, that is very apparent after quitting the other. Another 'Madonna and Child,' by Raphael, is in the room, and a very beautiful one it is, but certainly far inferior to that of which we have just spoken. It is in his early manner and was evidently painted soon after he quitted the studio of Perugino. That we first noticed bears the date of 1508.

The name of Michael Angelo is attached to a 'Dead Christ,' but without the slightest hesitation we pronounce it not to be his. About the rudest even of his drawings there are a breadth of conception and power of hand, which are entirely wanting in this very ordinary production.

Much as we should like to notice the various pictures in detail, our space entirely forbids our attempting to do more than name two or three of the more famous without dwelling on them. The collection is unusually rich in the works of Andrea del Sarto; among others is an admirable portrait of himself; he is dressed in a full and graceful robe and is looking steadily at the spectator, from behind a table at which he appears to have been writing. It is a manly unaffected portrait and capitally painted. There are some other portraits, and three unintelligible pictures connected with the history of Joseph by the same hand. By Guido there is a 'Sibyl' painted in his freest and best manner. Salvator Rosa has a landscape, a view by the Sea-shore, of great brilliancy. It has suffered a little perhaps in cleaning, but it is a masterly work, and entirely destroys a landscape by Wilson that has been very injudiciously hung above it. There is a large 'Equestrian Portrait,' by Rembrandt, the only one, we believe, he ever painted. Some fault might be found with the drawing, but the chiaroscuro is as broad and effective as it almost always is in his pictures. There is also a portrait of 'Quesnoi,' the sculptor, called 'Il Fiamingo,' by Nicolas Poussin, which displays refined feeling, and is the more interesting from the fact of Poussin having painted so few portraits. Besides these there are other pictures by A. Carracci, Vandyke, Velasquez, Cuyp, &c. Altogether, as we said above, the collection is a most choice one, and the ready liberality with which access is granted to it greatly heightens the enjoyment felt in its contemplation.

As we have suggested a visit to Panshanger as one of the most agreeable day's excursions from London, we will just point out how it may be easiest accomplished. By the North-Eastern Railway* the visitor can at once reach Hertford, from whence a pretty walk of little more than two miles will bring him to Panshanger. The way is by the north road for about a mile beyond Hertford, and then along a very rural road on the left of the main one, till the lodge is reached. Dr. Waagen says, that 'being a great walker,' he managed to reach it on foot from Hertford by the aid of a guide; but the most feminine of our readers need not fear being tired by the length of the way, or be deterred by its difficulty. As we have hinted, the collection is not of a kind to be hastily examined, and the visitor is allowed to remain as long as he pleases in the room, especially if the family is absent. Still by a little management and leaving London by the half-past nine o'clock train, time enough will be afforded for a stroll through the park, which should not be omitted; and there are many walks beyond its limits of remarkable beauty, particularly up some of the lanes to the west of it. The stranger should not, however, wander too far; Hertfordshire ways are very crooked and Hertfordshire directions crookeder, and he might perchance find himself too late for the last train.

COMMERCIAL VALUE OF THE DIAMOND.

In our Nos. 425 and 636 were given two articles relating to the diamond: the one concerning the mode of finding the diamonds at the mines of Sumbhulpore in India; and the other concerning the diamond-carriers of Brazil. There are, however, other interesting

* The North-Eastern Railway, being on a level with the country it traverses nearly all the way to Hertford, is one of the pleasantest lines for a holiday excursion out of London; the fares too are moderate, and it is well managed. The only drawback, and it is not a small one, is the utter disregard to the personal comfort of all other than first class passengers. The second class carriages seem as far from 'comfortable' as well can be, but the third class have not only no protection from the weather, but are without seats, and altogether far less agreeable than those provided for the conveyance of bullocks for the Smithfield Market.

details connected with the commercial history of the diamond which may merit a little notice.

From very remote times the diamond has been deemed the most costly production in nature. Its rarity and its extreme hardness appear to have been the causes of this high repute; for the brilliancy and lustre, which are now estimated so highly, could not be appreciated at a time when the art of cutting and polishing the diamond was not yet known. At a later period, when the Saracens had established themselves in Spain and other countries bordering on the Mediterranean, the diamond was supposed to be endowed with certain occult qualities and virtues, whereby it was held as an infallible specific in many diseases, as a test of conjugal fidelity, as a reconciler of domestic strife, and as an amulet of great power against poisons, insanity, witchcraft, incantations, goblins, and evil spirits. All the precious gems were regarded superstitiously in these respects, but the diamond more than the rest. Even so late as the beginning of the seventeenth century the belief in certain hidden virtues in this gem still prevailed; but after that period the superstition, like many others of a similar kind, died away: and the diamond became studied in respect to its natural qualities, like any other substance.

We are wholly without means of knowing where or when diamonds were first found. Whether in India or elsewhere, it is certain that they were procured long before the time when any naturalist wrote on such subjects. Even Pliny speaks of the "ancient writers" who described the diamond, and says that it was found in Africa before it was known to exist in India. The discovery of the diamond in Brazil, however, being not much above a century old, is capable of being recorded with more detail: and we will borrow from Mr. Mawe's 'Essay on Diamonds' the chief points relating to this discovery.

Gold has been long found in Brazil; and it was in searching for this precious metal that the still more precious gem was discovered. In the early part of the last century, while some gold-miners were working in an inland part of Brazil, they met with some singular substances resembling pebbles, in regular geometrical forms. The peculiar hue and lustre of some particular specimens attracted the notice of the negroes, who showed the pretty shining pebbles to their masters. They were laid aside when met with, and gradually came into fashion as counters in playing at cards. The people were wholly ignorant of their value; though their striking appearance and regularity of form created a general interest in them, similar to that which induces persons to collect pebbles and shells on our sea-beaches.

In this unappreciated state the gems remained for some time, until an officer arrived who had been in India, and who was tolerably acquainted with the geometrical forms of crystals. At the social parties which he visited, these pretty counters attracted his notice. Having obtained some, he examined them more minutely when alone, and was particularly struck with their geometrical symmetry of form. He compared them with common pebbles of the same bulk, which he purposely gathered; but he could not find any that at all resembled them in regularity. After some time the stones accumulated to a great number; and all persons in the neighbourhood, who were in the habit of amusing themselves with cards, possessed a larger or smaller number, which circulated among them without exciting the least surmise as to their real worth.

The officer before mentioned tried various experiments on these little pebbles. The currency of the country was gold-dust, in various quantities, such as the eighth of an ounce, half an ounce, &c.; and as small scales were in general use for weighing this dust, the officer conceived the idea of weighing these counters against common pebbles of equal size, but found that the former always exceeded the latter in weight. He then tried to make an impression upon one of the counters by rubbing it on a stone with water; but the only effect produced was that the stone was worn away. An opportunity having presented itself, he sent a small parcel of the counters by a friend to Lisbon, for the purpose of having them examined; these were given to lapidaries who had been in the habit of working only on common gems; and their report was, simply, that the gems were too hard for their tools.

At length, by mere accident, the Dutch consul saw some of these counters, and gave his opinion that they were diamonds. Some were immediately forwarded to Holland, where they were manufactured into brilliants, and were pronounced to be diamonds equal in quality to those from India. The returning fleet carried this favourable news to Brazil, whence it was rapidly communicated to the interior, where a commercial ferment soon arose, as might naturally be expected. The diamonds were quickly bought up; and all the pretty counters became in three or four days the property of about as many persons. In consequence of this event, diamonds were now sought for with the greatest avidity. Extensive speculations took place; and the diamonds arrived in Europe in such abundance as to excite an apprehension that the market value would be greatly depreciated. To counteract this, a report was industriously circulated that the Brazilian diamonds were decidedly inferior to the Oriental. Others, interested in the trade of diamonds, denied that these newly introduced gems were the produce of Brazil, and declared them to be the refuse of the Indian mines, sent from Golconda to Goa, thence to Rio Janeiro, and thence to Lisbon. These misrepresentations excited throughout Europe a great prejudice against Brazilian diamonds, which thereupon fell greatly in value.

A small number of speculators then formed a plan for restoring the Brazilian diamonds to the reputation which they really deserved, and which was only clouded by a temporary prejudice. They bought up all that were offered, secretly sent them to India, and had them there made up into parcels like the regular Indian diamonds. As they were really equal to those of India, the diamond merchants of Europe readily bought them as India diamonds, and gave the customary price for them. This test convinced most persons in time that the low estimation of Brazil diamonds was not a just one; and a regular and extensive trade in these gems became thereupon established.

The Brazilian diamond mines belong to the crown; and any trade whatever in these gems by other parties is declared contraband, and is visited with severe punishment; although there are occasional instances of private traffic in a surreptitious form. The district of Brazil in which the diamonds are found is of small extent, no one is allowed to enter it without special permission, and if travellers are obliged to pass through it, they are always escorted by a soldier, and not allowed to make any stay.

Mr. Mawe thus describes the manner in which the diamond-merchant makes his estimate in buying a *Bolsa*, or lot, of diamonds. He first places them in a good light, on a sheet of white paper laid on a table, and then divides or separates them into various sets according to their size. When the lot is large, for the purpose of more easily separating the greater stones from the smaller, the merchant has small sieves, or boxes of tin pierced with numerous holes. One sieve, for instance, will suffer all diamonds to pass through

which do not weigh two carats, retaining stones of larger size; another will suffer those to pass which are below a carat and a half, or a carat; and so forth. A lot of diamonds rarely contains any individual stones above four carats' weight; all that exceed that limit being generally sold singly. The stones which are badly coloured, or veiny, or ill shaped, are set apart by themselves, all the larger stones are weighed and carefully examined, and then the inferior stones. The merchant calculates the separate value of each large stone, and afterwards the value of the various parcels. His next object is to estimate the expense of making them into brilliants, &c., the loss of weight in cutting, and the price at which they will probably sell when manufactured; and from all these data he calculates the sum that he will be willing to give for the whole parcel.

The commercial value of diamonds is a very curious feature, almost as much so as that of celebrated pictures. The plenty or scarcity in the supply, the uses to which the diamond may be applied in the arts, the exigencies of those who have diamonds to sell, and, more than all, the fluctuations of fashion in respect to the wearing of diamonds as personal ornaments, all influence this commercial value. There are, however, certain general rules among the wholesale dealers in these gems, which guide them in their purchases. In the first place the diamonds are estimated by weight. A weight called a *carat* (equal to rather more than three grains Troy) is taken as an unit, and is divided into halves, quarters, eighths, and sixteenths, to give fractional parts. Then the quality and form of the diamond are examined, and a price per carat fixed from all these circumstances. The larger the diamond the greater price per carat is given for it. Rough diamonds (that is, such as are not yet cut and polished), comprising stones from the smallest sizes up to four carats' weight, are estimated one with another to be worth from thirty to forty shillings per carat. Diamonds, when cut into brilliants, and when consequently much of the weight has been lost by abrasion, are of course much higher in value per carat; when below a carat in weight, they are from seven to ten guineas per carat; while a brilliant of five carats would be worth thirty or forty guineas per carat. It is said that a rough approximation, in common cases, is sometimes made by adopting the two following rules:—for rough diamonds, square the weight of the stone, multiply the product by two, and the result will be the value in pounds sterling:—for brilliants, square the weight, multiply the product by eight, and the result gives the value in pounds sterling. These rules, however, rather serve to illustrate the rapid increase in the value of diamonds according to their weight, than give accurate details on a matter subject to so many fluctuations.

When a diamond exceeds five or six carats in weight, its value is determined rather by the eagerness with which it is sought for, than by any particular rule. Hence the enormous prices given for diamonds of large size and fine quality. Tavernier mentioned a diamond which was possessed by the Great Mogul, and which weighed nearly three hundred carats, being in size half as large as a hen's egg. A large diamond of singular form, weighing nearly two hundred carats, formed the eye of an Indian idol; it was stolen by a soldier, who sold it at Madras for 2000*l.* to the captain of a ship, by whom it was sold for 20,000*l.*; and after many changes it became the property of the Empress Catherine of Russia, who gave for it 90,000*l.* in cash, 4000*l.* a year annuity, and a patent of nobility. The Regent diamond, as it has been called, was bought by a Mr. Pitt, governor of Bencoolen, for 20,000*l.*; it weighed in the rough state more than four hundred carats, and after having it cut into a brilliant (which operation cost 3000*l.* in money and two years in time), he sold it to the Duke of Orleans, Regent of France, for 135,000*l.* In 1791, when the National Assembly caused an inventory to be taken of the crown jewels, a commission of jewellers estimated the value of the Regent diamond at more than 400,000*l.* sterling. The Pigott diamond, estimated to be worth 40,000*l.*, was made the subject of a lottery in the early part of the present century; it was won by a young man who sold it for a low price; and after changing hands several times it was purchased by Mehemet Ali for 30,000*l.*

In like manner Saxony, Austria, and other countries, especially Portugal, possess diamonds of large size, which are treasured up by the respective sovereigns as conspicuous insignia of royalty. The diamonds belonging to the Portuguese crown twenty or thirty years ago (civil broils may have disturbed these riches as well as others in the interim) were estimated by Mr. Mawe, who was permitted to inspect them, to be worth two millions sterling. Diamonds so large as to be very costly, and yet not so large as to have an historical notoriety about them, can with difficulty meet with a purchaser. Mr. Mawe mentions an instance in which a gentleman gave 12,000*l.* for a large diamond, and kept it for twenty years without meeting with a purchaser; but being at length obliged to realize his capital, he spent two years in offering the diamond all over Europe, and at last sold it for 9000*l.*, three-fourths of what it cost him.

The Valley of Mexico.—Conceive yourself placed on a mountain nearly two thousand feet above the valley, and nine thousand above the level of the sea. A sky above you of the most perfect azure, without a cloud, and an atmosphere so transparently pure, that the remotest objects at the distance of many leagues are as distinctly visible as if at hand. The gigantic scale of everything *first strikes you—you seem to be looking down upon a world.* No other mountain and valley view has such an assemblage of features, because nowhere else are the mountains at the same time so high, the valley so wide, or filled with such variety of land and water. The plain beneath is exceedingly level, and for two hundred miles around it extends a barrier of stupendous mountains, most of which have been active volcanoes, and are now covered some with snow, and some with forests. It is laced with large bodies of water looking more like seas than lakes—it is dotted with innumerable villages, and estates, and plantations; eminences rise from it which, elsewhere, would be called mountains, yet there, at your feet, they seem but ant-hills on the plain; and now, letting your eye follow the rise of the mountains to the west (near fifty miles distant), you look over the immediate summits that wall the valley, to another and more distant range—and to range beyond range, with valleys between each, until the whole melts into a vapoury distance, blue as the cloudless sky above you. I could have gazed for hours at this little world while the sun and passing vapour chequered the fields, and sailing off again, left the whole one bright mass of verdure and water—bringing out clearly the domes of the village churches studding the plain or leaning against the first slopes of the mountains, with the huge lakes looming larger in the rarefied atmosphere. Yet one thing was wanting. Over the immense expanse there seemed scarce an evidence of life. There were no figures in the picture. It lay torpid in the sunlight, like some deserted region where nature was again beginning to assert her empire—vast, solitary, and melancholy. There were no sails—no steamers on the lakes, no smoke over the villages, no people at labour in the fields, no horsemen, cooches, or travellers but ourselves. The silence was almost supernatural; one expects to hear the echo of the national strife that filled these plains with discord yet lingering among the hills. It was a picture of "still life," inanimate in every feature, save where, on the distant mountain sides, the fire of some poor coal-burner mingled its blue wreath with the bluer sky, or the tinkle of the bell of a solitary muleteer was heard from among the dark and solemn pines.—*Mayer's Mexico as it was and as it is.*



[Hertford Castle.

RAMBLES FROM RAILWAYS.

The Lea.—No. III.

Hertford is a busy, respectable town: it has a bustling appearance on a market-day, and still more at assize times. There is much of historical interest attached to the town, yet it has few historical relics. The castle, which is almost the only one, it has been said was erected by Alfred, but it is far more probable that it was built about 909 by Edward the Elder, who is also reported to have rebuilt and fortified the town, which had been destroyed by the Danes. Hertford is supposed to have been a principal residence of the East Saxon kings. When the Dauphin Louis contested the English throne with King John, Hertford castle was stoutly defended on behalf of the king by Godarvil, who however was at last forced to capitulate. Edward II., in 1345, gave the castle to John of Gaunt for his residence; and while he held it, John, king of France, and David, king of Scotland, were prisoners in it. At the time of the deposition of Richard II., Henry, the son of John of Gaunt, held his court in the castle. Several succeeding monarchs occasionally resided in it: among others Queen Elizabeth; and a small chamber is shown in the highest tower as the place of her captivity. There is, however, no evidence, beyond the tradition, to prove that she ever was confined in it: probably the tradition arose from the circumstance of her having dwelt there. There is little remaining of the ancient castle, the only portions being some of the outer walls, and two or three towers with a few chambers attached. These are of brick, and in tolerable preservation, though not in the original state, they having been repaired and fitted up as a residence. Our engraving of it is from a sketch taken from the Lea, which flows below it. In the grounds of the castle are a couple of Lombardy poplars of unusual size and beauty.

Hertford was, in 1647, the head-quarters of the Parliament army; and it was here that the mutiny of Lilburne's regiment occurred, which at first threatened to be fatal to the Parliament cause. Cromwell, however, by one of those prompt acts that were so natural to him, averted the danger. Directly the mutiny broke out, he removed the army to Ware, and having, on addressing the troops, discovered that the disaffection was confined to one regiment, he at once surrounded it, and took measures to render its resistance unavailing. He then called a council of war, and having seized the ringleaders, three were condemned to death, and from them one was chosen by lot and instantly shot at the head of his regiment, the others being retained in the hands of the marshal as security for the obedience of the remainder of the regiment.

The neighbourhood of Hertford yields an agreeable variety of pleasant walks. The banks of the Lea, between it and Ware, cannot however be greatly praised for their beauty: at any rate we need not linger beside them, as we shall soon reach some more pleasanter and, from various reasons, more interesting character. We may, however, just notice that Chadswell Springs, which form the source of the New River, by means of which so large a portion of London is supplied with water, are situated in the meadows about midway between Hertford and Ware, nearly opposite Ware Park, and at a short distance from the banks of the Lea. The site of the principal spring is marked by a stone, erected by the New River Company, which informs us that it was opened in 1608, and that the water is conveyed forty miles. From the spring the water flows into a circular basin, surrounded by a light wooden railing, and thence into a channel, which, having been swelled by some cuts from the Lea, runs for several miles parallel to that river.

Ware is an ancient town, being mentioned in Domesday-book, and has all the old-fashionedness that might be expected from its antiquity; yet there is nothing of consequence to notice in it. The houses are none very remarkable, nor are there any remarkable remains: indeed what chiefly attracts the attention of a stranger is the number of malt-houses it contains, and they are not very ornamental. On the banks of the Lea, a short distance from the church, are some portions of a priory that belonged to a body of Benedictines, who were subordinate to the Abbey of St. Ebrulf, at Utica in Normandy. There is a large bed, twelve feet square, at one of the inns, but it is not the veritable "great bed at Ware" that Shakspere mentions. That, however, we believe was in existence not many years back; it is referred to in all the histories of Hertfordshire, and in

old Chauncey's the reader may see "a merrie tale" connected with it—a specimen—not a very delicate one—of the practical jokes of our ancestors. The Danes, under Hasting, sailed up the Lea to Ware, at which place, or at Hertford as some assert, they formed a camp. Alfred erected two strong forts immediately below their station, and by draining the channel of the Lea, got possession of their fleet, and compelled them to retreat into Gloucestershire. Chauncey relates that "in the 25th of Henry III., on the 27th of June, Gilbert Marshall, Earl of Pembroke, a potent peer of the realm, proclaimed here a disport of running on horseback with lances, which was then called a tournament." At this tournament Gilbert himself was killed by a fall from his horse: Robert de Say, one of his knights, was slain, and several others were wounded.

Following our stream we soon reach Amwell, whose hill, rising on our right and crowned with the old church, has an exceedingly picturesque appearance. Amwell has been noticed by Walton, and celebrated in pleasant verse by John Scott:—

"The pleased eye, which o'er the prospect wide
Has wander'd round, and various objects mark'd,
On Amwell rests at last, its favourite scene.
How picturesque the view! where up the side
Of that steep bank, her roofs of russet thatch
Rise mix'd with trees, above whose swelling tops
Ascends the tall church tower, and loftier still
The hill's extended ridge."

Scott of Amwell, as he was called, like many another poet of celebrity in his own day, is slipping out of memory now: a few words about him will not therefore be out of place in connection with the spot so closely associated with his name. John Scott was born in Bermondsey in January, 1730, and succeeded early in life to some property in Amwell, where he fixed his dwelling, and, excepting some portion of each year spent at a house he had in London, continued to reside there till his death, which occurred in December, 1783, at his London residence. His parents were members of the Society of Friends, in which communion he remained during his life: forming therefore one of the very small[illegible] of Quaker poets. Dr. Johnson, who esteemed him highly, undertook to write his life, but his own death prevented the accomplishment of his purpose. It was afterwards written by Hoole, the translator of Tasso: but it is utterly devoid of interest, for his life ran "smooth as his verse:" like Goldsmith's Vicar, all his adventures were by the fire-side, and all *his migrations from the blue bed to the brown, or, in* Quaker speech, from his country house to that in town. He was possessed of a fine intellect, though wanting that something which constitutes genius in the man, and can alone impart vitality to his verse. By his contemporaries he was thought highly of, and will be read with pleasure now by those who meet with his works and can listen to the melody of the oaten pipe. One at least of his smaller poems will retain a place in the collections:—

"I hate that drum's discordant sound
Parading round, and round, and round.
* * * * * *
To me it talks of ravaged plains,
And burning towns, and ruin'd swains,
And mangled limbs, and dying groans,
And widows' tears, and orphans' moans,' &c.

His poetry is nearly all of the "pastoral" kind, and has the smoothness and neatness, the facile flow, and something of the "refined rusticity" that ought to characterize productions of that class. But there is an absence of human character and interest that soon renders the sweetest pastoral poetry wearisome. Hoole objects to the introduction of so many of the words and phrases in common use; instead of being in the received Idyllic mode, it is like real country life and scenery: his refined taste cannot endure its rusticity. That taste has now happily worn out; the poet was wiser in that than his biographer. Scott's great defect is his want of strength and life, but there is a Quaker-like simplicity that is very agreeable, at least for a while. His conception of country life is very unlike that of Crabbe—indeed there is a deficiency of nerve in almost all he wrote that causes his placidity and sweetness to cloy. He wrote a great many occasional pieces; his principal work is named from the place that has caused this digression—Amwell. The view from Amwell-hill is a very fine one, and we gladly avail ourselves of Scott's description of it, which will serve as a sample of his descriptive style, and be more pleasing, we are sure, to our readers than any account we could give of the prospect:—

"How beautiful,
How various is yon view! delicious hills
Bounding smooth vales, smooth vales by winding streams
Divided, that here glide thro' grassy banks
In open sun, there wander under shade
Of aspen tall, or ancient elm, whose boughs
O'erhang grey castles, and romantic farms,
And humble cots of happy shepherd swains.
* * * * * *
Far towards the west, close under shelt'ring hills
In verdant meads by Lea's cerulean stream,
Hertford's grey towers ascend; the rude remains
Of high antiquity, from waste escap'd
Of envious time and violence of war."

The church is a pretty building, and altogether the place would be very pleasing even without its associations. It is mentioned in Domesday-book under the name of Emme-well, and has been thought to derive its name from a well at the foot of the hill called Emma's-well, which now forms a part of the New river. At Amwell the New river is a little better looking than elsewhere; its banks are planted with some fine willows and a little islet adorns the stream. On the isle is a stone with an inscription, referring to the well, by Scott, and the island is mentioned by him in his poem of Amwell:—

"Slow beneath that bank the silver stream
Glides by the flowery isle, and willow groves
Wave on its northern verge, with trembling tufts
Of osier intermixed."

"On the hill above the church are traces of a very extensive fortification [Qy. that above referred to], the rampart of which is very distinguishable on the side overlooking the vale through which the river Lea flows. In this parish also, on the side towards Hertford, is *Barrow field*, wherein is a large tumulus; and not far distant are remains of an ancient road, probably of Roman origin."* These the visitor will discover readily enough, and altogether he may spend an hour or two at Amwell very agreeably.



[Chadswell Springs.]

* Brayley

LORENZO DE' MEDICI.

"The magnifico is well beloved,
And hath in his effect a voice potential."—*Othello.*

The term 'magnifico,' which in Italy, as Shakspere seems to have known, was frequently applied to noble or rich men who had great influence in the state, has become the distinguishing epithet of Lorenzo de' Medici, as peculiarly appropriate to his princely qualities, to the extensive reputation which he acquired, and to the political power which that reputation gave him, not only in Florence, but throughout Italy. To all who are acquainted with the history of those times he is now as well known by the appellation, 'Il Magnifico Lorenzo' (Lorenzo the Magnificent) as by that of Lorenzo de' Medici.

Lorenzo de' Medici was born January 1, 1448. His father, Piero de' Medici, the son and successor of Cosimo, married Lucrezia Tornabuoni, of a citizen family, but one of the most accomplished women in Florence, and distinguished as a poetess. Giuliano de' Medici, Lorenzo's younger brother, was born in 1453.

Cosimo de' Medici died in 1464, and his son Piero then became head of the Medici family, and actual governor of the state of Florence. Piero was always of weak constitution, and the infirm state of his health rendered him little fit to undergo the vigilant superintendence requisite to keep in check the turbulent Florentines; but he was a well-meaning and prudent man, and availed himself of the talents and activity of his son Lorenzo, who, though only sixteen years of age at the death of his grandfather Cosimo, was well qualified to render important assistance to his father. Lorenzo's intellect was naturally of the highest quality; he had been instructed in classical learning by the first scholars of the day: his political education had been conducted under his grandfather and his father; his skill in poetry and taste in the fine arts had been early developed under the guidance of his mother: he was very tall and robust, and delighted in country sports; and was trained under the first masters in all the personal accomplishments and military exercises which were deemed essential to expand to its full perfection the character of one who was likely to become the head of the most influential family in Florence and the actual ruler of the state.

After the death of Cosimo, Lorenzo was sent by his father to visit the different courts of Italy. In 1466, some time after his return, the family of Acciajuoli entered into a conspiracy with Luca Pitti and others to assassinate Piero, and wrest the government of the state from the hands of the Medici while his sons were yet too young to offer any effective opposition. The conspirators engaged a body of thirteen hundred cavalry to enter the territory of Florence. Piero, when informed of this demonstration, was at his country house at Careggi, and was suffering so severely from gout as to be unable either to walk or ride, but directed his attendants to bear him in his chair to Florence. Lorenzo, who had left Careggi a short time before his father, met with armed horsemen on the road, who appeared to be in wait for some one. Suspecting their intentions, he immediately despatched an attendant to direct his father to proceed to the city by a circuitous and unfrequented road; Lorenzo himself went forward by the direct road, and informed those who inquired after his father that he was following at a short distance. Lorenzo's promptitude probably saved his father's life and destroyed the conspiracy. The whole intrigue was discovered. Luca Pitti deserted and betrayed his associates. The chief members of the Acciajuoli family were sentenced to banishment. Luca Pitti, on account of the disclosures which he had made, was not included in the sentence, but the reputation in which he had lived under Cosimo, to whom he had acted as a sort of prime minister, was gone. Two magnificent palaces, both designed by Brunelleschi, one outside the gate of San Niccolo, the other in Florence, and still famous as the Pitti palace, were in great part built during the administration of Cosimo. After the disclosure of his conduct in this affair, the work of the Pitti palace, which had been mostly performed by the voluntary contributions and gratuitous labour of the citizens, ceased, and the rest of his life was passed in the obscurity and contempt due to ingratitude and treachery.

Piero de' Medici died Dec. 2, 1469, in his fifty-third year. Lorenzo was then twenty-one years of age and Giuliano sixteen. Two days after this event the principal inhabitants of Florence came to Lorenzo's house to offer their condolence, and to request him to take on himself the care of the state, and to be, as his grandfather and his father had been, a bond of union to the citizens and security to the city; a charge which, after some professions of reluctance on account of his youth, he undertook.

At the time of Piero's death the Florentines were at peace. Of the other states of Italy, Venice was the most powerful, and was governed by its doge and senate; Naples was ruled by its king, Ferdinand of Aragon, who had succeeded his father Alfonso in 1458; Galeazzo Maria son of Francesco Sforza, held the state of Milan as duke, to whom Genoa was also subject; Paul II. filled the papal chair and governed the states of the church; Borso d'Este was marquis of Ferrara, Sienna and Lucca were free cities with an independent government.

Florence continued to be peaceful and prosperous. As Giuliano was only sixteen years old at the death of his father, the administration of public business for some time rested entirely upon Lorenzo; but as the brothers had been brought up in the same studies, had partaken of the same amusements, and there subsisted between them the warmest friendship, Giuliano gradually became his brother's coadjutor, and his gentle and amiable manners made him a favourite with all ranks.

The pope, Paul II., a profligate and illiterate priest, between whom and the Medici there subsisted an irreconcilable enmity, died July 26, 1471, and was succeeded by Sixtus IV., who proved to be even more unprincipled and rapacious than his predecessor. Lorenzo, at the head of six of the principal citizens of Florence, was deputed to congratulate him. Lorenzo had a bank at Rome, which was managed by his maternal uncle Giovanni Tornabuoni as agent. The pope appointed Lorenzo treasurer of the Holy See, and his uncle of course acted as his deputy.

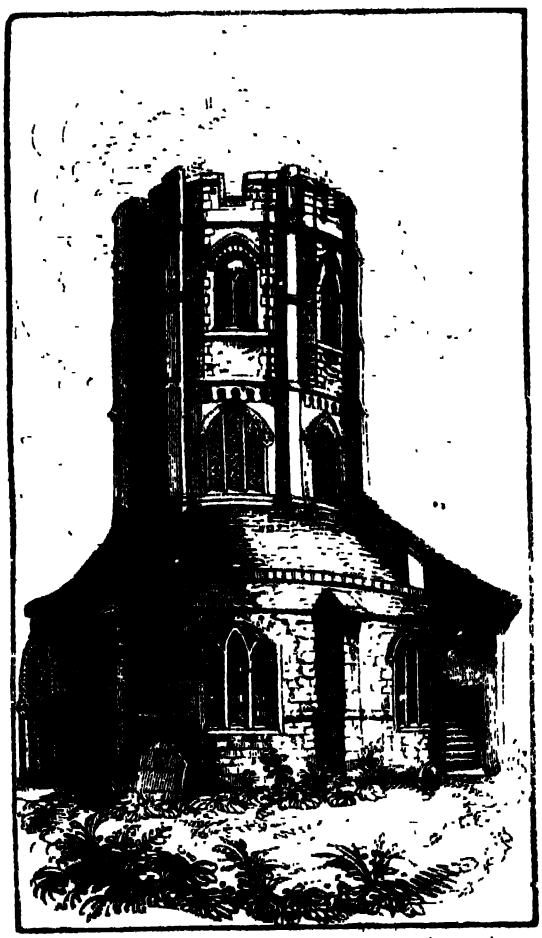
In 1472 Lorenzo repaired to Pisa, for the purpose of re-establishing the university, which had for some time been neglected, and had fallen into disrepute. In 1473 he was engaged by Louis IX., king of France, in negotiating a marriage between the dauphin and the daughter of the king of Naples, who, however, refused to accede to the wish of the French king. Soon afterwards he incurred the enmity of the pope by lending his aid to Niccolo Vitelli, who was lord of Castello, which town Sixtus endeavoured to obtain by force, and ultimately succeeded. In order to resist more effectively similar aggressions in future, Lorenzo in 1474 organized a league between the duke of Milan, Venice, and Florence; the consequence of which was that the pope was still more incensed, and not only deprived him of his office of treasurer of the Holy See, but became ever afterwards his most inveterate enemy.

Lorenzo de' Medici thus continued, with the assistance of his brother Giuliano, to conduct prosperously the affairs of the state of Florence, and to occupy his

leisure with the study of the philosophy of Plato, the composition of Italian poetry, and the conversation and society of learned men and artists.

In 1478 a conspiracy was entered into for the assassination of Lorenzo and Giuliano, which, considered with reference to the persons engaged in it and the manner in which it was carried into execution, is unparalleled for atrocity in the annals of any nation. It is generally known as the conspiracy of the Pazzi, but in fact the instigators and leaders of it were Francesco de' Pazzi, the Pope Sixtus IV., Count Girolamo Riario, nephew of the pope, and lord of Imola and Forli, and Francesco Salviati, archbishop of Pisa. Others were engaged in the conspiracy, but they were apparently drawn in by family connection and by the influence of the leaders, or they were mere hired agents.

[To be continued.]

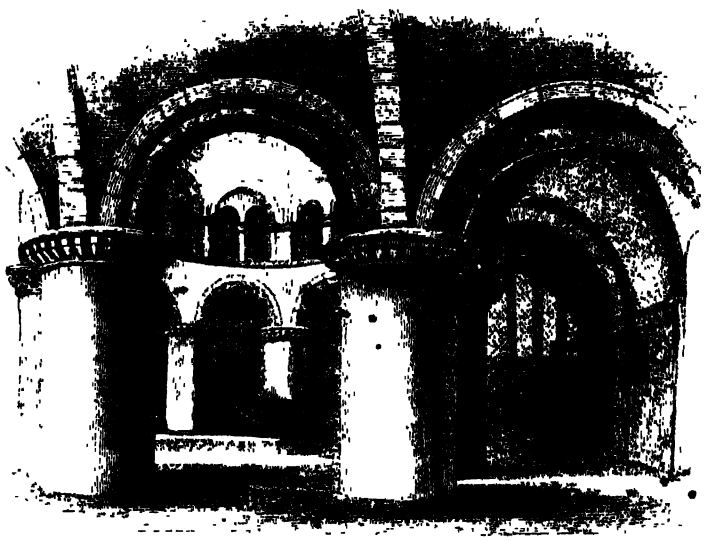


[Round Church Cambridge,—Exterior.]

THE ROUND CHURCH AT CAMBRIDGE.

THE church of the parish of the Holy Sepulchre, or St. Sepulchre, as it is called, is one of the very few churches built in a circular form, and is the oldest of those erected in England, exhibiting a very curious specimen of ancient architecture. It is 41 feet in its internal diameter, and has a peristyle of eight clumsy pillars supporting circular arches with chevron mouldings. The upper story of the tower and the square part of the east end are Gothic. Churches of this form have been usually attributed to some connection with the Knights Templars; but it is alleged in this case that it was consecrated in the year 1101, or several years before the institution of the Order of Knights Templars; so that it can hardly be attributed to them. In a paper recently read before the Camden Society, the church is supposed to have been founded by some one interested in the recovery of the Holy Sepulchre at Jerusalem,—hence the imitation of the form of that building, and the name; and that the object in view was to make provision for constant prayers for the success of the crusaders. We learn from the same pages some other interesting matters. The parish has been traditionally known as the Jewry, which designation it is supposed was given to it in consequence of the model of the most sacred of Jewish structures being placed in it. The stained glass votive window, with a saintly figure, which attracts the eyes of visitors in the restored Church, it appears preserves the memory of Bede's legendary residence in the vicinity. It had been long neglected, and was in a very dilapidated state, when fortunately the better taste that has been recently evinced for the preservation of our national monuments directed attention to it, and, following the laudable example set by the Templars in their restoration of their beautiful church, a local committee undertook to effect a similar restoration for this the most

interesting antiquity of their town. Of their labours on this important structure it is hardly possible to speak too highly. The entire funds, with the exception of some 1600*l.* still required, have been raised by voluntary subscription, and expended by a little band of ardent and reverential lovers of all that is antique, grand, or beautiful in our ecclesiastical architecture. The Camden Society especially stands conspicuous in the good work, which has been carried on, we are sorry to learn, through "repeated interruptions and obstructions," and which has—a common case—proved a much more elaborate and costly task than was anticipated. The substantial reparation of the decayed fabric was the object the committee set before themselves; and, much as these words include, it seems that they have found it necessary to add the enlargement of one aisle, the entire erection of another, a new bell-turret, "breaking up the unsightly uniformity of the rest of the building," the entire fitting of the church with open seats and other necessary furniture in carved oak, and lastly, the beautiful east window. They have thus involved themselves in debt to the amount before stated, but we do not think they will have relied in vain on the public sympathy and assistance. The stately solemn-looking fabric, so eloquent of those mighty primeval artists, those architectural giants of our early history, who "dreamt not of a perishable home" when they dedicated their skill and cunning to the service of the Almighty, appears again fresh as it were from their very hands. The restoration was completed and the church given up to the parish authorities on the last day of the year 1843, since when, we are sorry to say, there has been a warm attack on the orthodoxy of the style in which the repairs have been performed. Into the merits of this dispute we do not mean to enter; but regret that any dissatisfaction should have arisen, as it will probably throw impediments in the way of its completion. Both our views show the church in the state previous to its renovation.



[Round Church, Cambridge Inte

THE FERTILIZATION OF LAND BY WARPING.

There are some counties of England so peculiarly situated with respect to the level of the sea, that the agriculturists can adopt a mode of enriching their land quite unavailable in those counties of a higher general level. Tracts which at first sight seem to be especially unfavourable, acquire by the very circumstance which gives them this unfavourable appearance a power of fertilization quite remarkable. It is to the system of *warping*, as practised in Yorkshire and Lincolnshire, that we here allude.

When a river flows through a country whose general level is below that of high tide, and the water of the river is of very muddy character, the operation of warping can then be carried out. It consists in allowing the water to flood the land at low tide by artificial channels and sluices, and retaining it there so that it may deposit the mud which had been suspended in it. This mud consists of various kinds of earth mixed with portions of vegetable and animal matter. New portions of water are admitted at every high tide, and these in like manner deposit their sedimentary matter. Each tide thus forms a new stratum; and in some places it is found that a layer one-tenth of an inch in thickness is deposited at each tide, amounting to nearly an inch and a half in a week. Thus in the course of a few weeks a new soil is created several feet in thickness, solely by the operation of this deposit of warp; and not only so, but the warping fills up all inequalities, and a perfectly level surface is produced. The land thus warped is said to possess a natural power of production which cultivation and manuring cannot imitate.

Such is the meaning of the process of *warping*. It is said to have been first tried in this country on the banks of the Humber about a century ago, but was first brought prominently into notice by Marshall in 1788: it has, however, been long known in Italy. Mr. Cadell, in his 'Journey in Carniola,' gives the following account of what came under his notice in reference to this matter:—"In the Val di Chiana fields that are too low are raised and fertilized by the process called *colmata*, which is done in the following manner:—The field is surrounded by an embankment to confine the water. The dyke of the rivulet is broken down so as to admit the muddy waters of the high

floods. The Chiana itself is too powerful a body of water to be used for this purpose; it is only the streams that flow into the Chiana that are used. This water is allowed to settle and deposit its mud upon the field. The water is then let off into the river at the lower end of the field by a discharging course called *scolo*, and in French *canal d'écoulement*. The water-course which conducts the water from a river either to a field for irrigation or to a mill, is called *gora*. In this manner a field will be raised five and a half, and sometimes seven and a half feet in ten years. If the dyke is broken down to the bottom, the field will be raised the same height in seven years, but then in this case gravel is also carried in along with the mud. In a field of twenty-five acres, which had been six years under the process of *colmata*, in which the dyke was broken down to within three feet of the bottom, the process was seen to be so far advanced that only another year was requisite for its completion. The floods in this instance had been much charged with soil. The water which comes off cultivated land completes the process sooner than that which comes off hill and woodland. Almost the whole of the *Val di Chiana* has been raised by the process of *Colmata*."

The peculiar position of the county of Lincoln offers great facilities for this process of elevation and fertilizing the surface of land. If we look at a map of the county, we find that one half of its somewhat oval contour is bounded by water. The Humber bounds it on the north, the Wash on the south-east, and the open sea on the east; and a very large portion of the district so bounded lies below the level of the sea, being protected from its encroachment by embankments. From the nature of such a soil as this, the rivers which flow through these low lands become charged with a large quantity of mud, and the mode in which this mud deposits itself will depend a good deal on the nature of the river banks. So great is the quantity of mud suspended in the tidal waters of the rivers entering the Wash, that the accumulation of the soil by warping, wherever the force of the winds and currents can be checked, is surprisingly rapid. Thus, for example, when a portion of the old channel of the Ouse, containing eight hundred acres, was deserted by an alteration of the drainage, it was warped up without any artificial aid to the height of twenty-five feet in five or six years.

The waters of the tides that come up the Trent, the Don, the Ouse (there is a Yorkshire river of this name flowing into the Humber, and another of the same name flowing into the Wash at King's Lynn), and other rivers which empty themselves in the estuary of the Humber, are excessively muddy: insomuch that in the summer season, if a cylindrical glass twelve or fifteen inches in height be filled with the water, it will presently deposit an inch of warp or sediment. It is to have this sedimentary matter at command that the process of warping is followed. There must be arrangements for keeping out and letting in water at pleasure; and consequently there must not only be a cut or canal made to join the river, but a sluice at the mouth of it, formed so as to open or shut; and in order that the water may be of a proper depth on the land to be warped, and also prevented from flying over contiguous lands, banks are necessary to be raised around the spot under operation several feet in height. The canal, the sluices, and the embankments are therefore three of the agencies employed in this operation, the waters of the river effecting all the rest. The land is usually divided by the embankments into compartments of from ten to twenty acres each, each having an entrance sluice and one or more return sluices. During the spring-tides, from July to October, the sluice of the canal is opened, the water fills this canal, and then enters by the lateral sluices into all the compartments. When the tide is at its height, all these lateral sluices are closed; and as it ebbs, the pressure of the water in the compartments forces outward the return sluices, and thus the water escapes into the canal, and afterwards into the river, after having deposited a large amount of sediment in each of the compartments where it had been dammed up for several hours. During the intervening hours before the next high tide the mud has time to acquire some degree of consolidation; and this being repeated twice a day for several weeks, a layer of fine soil becomes accumulated in each compartment.

In the year 1825 the Society of Arts voted its large gold medal to a gentleman who forwarded a particular description of a process of warping on a very large scale; and as this well illustrates the general character of the operation, we will give a few of the particulars in a condensed form.

This gentleman, Mr. Creyke, in a letter to the Society, states:—"In the neighbourhood of Rawcliffe House, where I reside, are many thousand acres of peat moss and waste land, which yield scarcely any annual rent, and which I thought (from experience that I had got in improving a considerable quantity of my own land near home) might be improved very much by being warped." With this view Mr. Creyke undertook to warp sixteen hundred acres from the river Ouse. A canal or main drain was cut, two miles and a half in length, reaching from the river to the spot to be warped. This drain was of very large dimensions, being thirty feet wide at the bottom, ninety feet wide at the top, and eleven or twelve feet deep. At the distance of nine feet from its edge on either side was formed an embankment of very solid earth, sixty feet wide at the bottom, and ten feet in height. From this central canal the land on both sides was to be overflowed at the warping-season; and the compartments so warped were surrounded by well-formed banks ten feet high, but not so wide or so bulky as those by the side of the main channel. A sluice was formed, with two openings of sixteen feet each, with substantial folding-doors. This sluice was very strongly built; it was formed of stones of large size, backed with brick, and was supported on a floor of wood placed on a series of large piles driven deep in the earth. Numerous inlets were provided in the main embankments, so managed as to admit the water at high tide, retain it for a time, and afford it an outlet at low tide. In the river Ouse, at the point where the sluice was erected, the tides flood for three hours and ebb for nine, and rise from fourteen to eighteen feet. It will be seen from this, therefore, that a vast body of water might be admitted into the canal, and that the sluice required to be strongly built.

In the first year, rather more than four hundred acres of waste land were embanked; and on it was deposited, in the course of that year, a fine alluvial soil of the average depth of near three feet. On the following year the allotment was sown with oats and seeds; and the seeds were afterwards either mown or depastured in the third year. In the fourth year it was sown with wheat, with very profitable results. No part of this allotment of four hundred acres had previously yielded any rent at all; whereas in the fourth year of the operations no part of it let for less than thirty-five shillings per acre. Four months afterwards Mr. Creyke announced to the Society that he had five hundred acres more (in addition to the four hundred in which wheat was growing luxuriantly) in a state of preparation for being sown with oats and grass seed; and that the remaining quantity of six hundred acres would be ready for agricultural operations in the same year.

It is plain from this description that the undertaking was altogether on a large scale, and could not have been carried out without the command of considerable capital. In answer to queries put to him on the part of the Society, Mr. Creyke stated that the sluice and its appendages cost more than five thousand pounds. The expense of the main drain was more than seven thousand pounds, exclusive of the purchase of the land, which was about five thousand pounds; making a total outlay of nearly eighteen thousand pounds. The large drain required considerable annual outlay to keep it in repair; and in the first year an additional expense of a thousand pounds was incurred in consequence of a breach in one of the banks.

In comparing this system of warping with those generally followed, Mr. Creyke remarked: – "The superiority consists in creating a fine deep rich soil, more effectually, upon a larger scale, and in a shorter time, than has hitherto been practised. According to the usual practice, the tides were only admitted during the months of August, September, and October; in mine they are admitted the year round. The sluice was not more than five feet wide, mine has openings of sixteen feet wide. The main drain was only twelve feet wide; mine is ninety feet wide. Not more than fourteen acres were embanked in one piece; I have enclosed five hundred acres in one compartment. Formerly not more than one and a half feet deep of deposit was obtained; I have got from three to four feet in the same time, upon the increased quantity of land. No levels used to be taken for the formation of the banks; the whole of my embankment has been laid out by the spirit level. Scarcely any inlets used to be made for the purpose of spreading the tide water quicker and more equally over the surface of the land within the embankment, as well as for the more speedy return of it upon the ebb; in my practice innumerable inlets are formed for this purpose."

As to the qualities of warped land for the purposes of agriculture, it has been observed that the atmosphere acts powerfully on the newly deposited warp; for before a fresh layer is deposited, which takes place within twelve hours, such an alteration has already taken place on the surface, that the new deposit does not unite in one mass with the last, but a regular stratification can be observed, which shows the quantity deposited in each tide. The new warp also requires to be stirred and exposed to the air for some time before it acquires its great fertility. The richest crops of beans, wheat, oats, and rape are raised without manure on the warp land: but it is not so well adapted for barley or turnips, on account of its slimy nature.

RICE-PAPER AND STRAW-PAPER.

The so-called Chinese *rice-paper* appears, from the inquiries of those who have directed their attention to the matter, to be very erroneously named. The name seems to imply that the substance is made from a pulp of rice, much in the same way as English paper is made from the pulp of rags; but if it be closely examined, and especially if it be held between the eye and a light, it presents all the appearance of a vegetable tissue, so perfect and so delicate that it could not have been produced by art.

Dr. Livingstone was the first to introduce this species of paper into Europe, at least in any considerable quantity, about the beginning of the present century; and it became greatly admired for the beauty of the artificial flowers made of it. It was an item in the gossip of the day, that the Princess Charlotte once paid seventy guineas for a bouquet made of rice-paper. The paper which Dr. Livingstone brought from China was in the form of leaves about four inches square, and which were dyed of different colours. Originally the cost was six shillings a leaf; but it gradually lessened, and the size of the leaves increased, so that they could be procured measuring twelve inches by five.

In 1820 Mr. Reeves, of Canton, communicated to the Society of Arts some information which he had collected concerning the mode of preparing the paper in China; from which it appears that rice-paper is not a manufactured article, but is a vegetable production cut spirally, and afterwards flattened by pressure. The branches of the tree or shrub are first cut into lengths equal to the intended breadth of the sheet of paper, and are placed upon a thick piece of copper, with two raised edges as guides to keep it steady. They are held in the left hand, and presented to the edge of a large sharp knife, about ten inches in length by three in breadth. A slight incision being made in the piece of branch for its whole length, it is kept moving round by the left hand, while the knife is also kept in motion by the right hand: and the branch is thus sliced or pared down from circumference to centre, and then spread out to flatten.

The membranous sheets thus produced are usually made up into bundles of nineteen or twenty each, which weigh about twenty-three ounces, and are sold wholesale for about a dollar a bundle. The refuse pieces are used for making artificial flowers. It is chiefly brought to Canton from the island of Formosa, by the Chinese junks; and hence for a long time arose the difficulty of ascertaining the nature of the plant, for few of the persons concerned in the sale of the prepared article at Canton had ever seen from what it was made.

At a later period General Hardwick communicated some details, which seem to point to the nature of the plant whence these filaments are produced. He says, "I think myself happy to have it in my power to afford you some precise information on the plant which furnishes the substance known under the name of rice-paper. It is the marsh æschynomene, the *æschynomene paludosa* of Roxburgh, of the family of the leguminous plants; and you will find the figure of it in my Atlas of the plants of India. It grows abundantly in the marshy plains of Bengal, and on the borders of the vast lakes called jeels, which exist in all the provinces between Calcutta and Hurdwar. It is a long-lived plant; its stem rarely exceeds two inches and a half in thickness; it is but of little elevation, but spreads considerably. Roxburgh, however, considered it as an annual: but it is only where it wants water that its stems dry up and die; as, where it finds the necessary supply of water, it continues green in all parts, and pushes out new branches every season. The middle of the stem, when broken across, is found to be formed entirely of pith, which is of a dazzling whiteness, and is about half an inch in thickness; this is covered with a bark so thin and tender that it may be easily removed with the finger-nail."

This plant is considered by General Hardwick to be the same as that which yields the Chinese rice-paper Great quantities of this plant are carried to the bazaars of Calcutta in the fresh state. The largest rods are chosen to be cut into the thin laminæ which constitute the rice-paper, and with which the natives make artificial flowers to decorate their idols on festival days. It is also used to make hats, by glueing together many leaves of it, so as to form it of a sufficient thickness; after which it is formed into the shape of a hat or cap, and covered with cloth or with silk, the membrane forming a very light but strong framework to the hat. Those branches of the plant which will not serve to make this paper are formed into bundles, which are sold to the fishermen, who employ them in making floats for their fishing-lines.

It has been suggested that the pith of elder and other plants might be worked up for similar purposes, by being sliced in this spiral manner into thin sheets, and then flattened by pressure between plates.

The Chinese also make paper from the bamboo. The stalks are cut near the ground, and are sorted into parcels according to the age, and tied up in small bundles. The younger the bamboo, the better is the quality of the paper made from it. The bundles are thrown into a reservoir of mud and water, and buried in the ooze for about a fortnight, to soften them. They are then taken out, cut into pieces of a proper length, and put into mortars with a little water, to be pounded to a pulp with large wooden pestles. After this, the paper is prepared from the pulp in a manner somewhat analogous to the English mode of making paper.

The papyrus of the Egyptians so far resembled the rice-paper of the Chinese that it consisted of filaments, or thin membranes, cut from the stem of a plant. The two extremities of the plant, viz. the head and the root, were cut off as of no use in this manufacture. The remaining stem was then slit lengthwise into two equal parts, and from each of these were stripped off thin scaly coats or pellicles with the point of a sharp instrument. The innermost of these pellicles were looked on as the best, and those nearest the bark or rind the worst; they were kept apart accordingly, and constituted different sorts of paper. When the pellicles were taken off, they were extended on a table. Two or more were then laid transversely over each other, so that their fibres might lie at right angles; and in this state they were glued together by the muddy waters of the Nile. They were afterwards pressed, to get out the water, then dried, and lastly flatted and smoothed, by beating them with a mallet; and they were sometimes further polished by being rubbed with a ball of glass. In other countries, where the muddy waters of the Nile were not at command, the pellicles were fastened together with paste made of the finest wheat-flour mixed with hot water.

It will thus be seen that the difference between the papyrus and rice-paper consisted mainly in this, that each little piece of skin in the latter case forms, when cut spirally, one sheet of paper; whereas, in the former, several pieces are cemented together to form a sheet.

In some degree analogous to these was the bark-paper employed by many nations among the ancients, and still employed by some rude nations. This consisted of the liber, or inner whitish rind enclosed between the outer bark and the wood of certain trees, such as the maple, the plane, the beech, the elm, and the linden-tree. This liber was stripped off, flatted, and dried; and in that state it was used as paper. The bark-paper was thicker and more brittle than the papyrus, as well as more apt to cleave or shiver, by which the writing was sometimes lost. This is illustrated by a bark manuscript in the Abbey of St. Germains, where the bottom of the paper remains, but the outer surface, on which the letters had been written, is in many places peeled off.

Attempts have been made in this country to produce paper from straw. The Neckinger Mills at Bermondsey, now occupied by the leather-dressing establishment noticed in our Supplement for May, 1842, was the scene of the first operations in this respect. The manufactory was afterwards removed to Thames Bank, but proved ultimately a failure. According to the method followed in those establishments, the straw, after being cut up into pieces about two inches in length, was steeped in cold lime-water, and afterwards subjected to the cutting action of the paper-mill. The paper thus produced from straw was harsh and ill-coloured, and never came into general use. There was, however, some years afterwards another method introduced by other parties, in which rather a complicated chemical process was followed. The straw was first freed from knots, and then boiled in a solution of any of the common alkalis, in order to extract the colouring matter, and to dispose the straw to become fibrous. After being washed, it was exposed to a mixture of quicklime, sulphur, and water, in order to free it from the mucilage and the siliceous particles which exist in all straw. It was then washed and beaten, to remove the odour of the chemical ingredients employed: then bleached by chlorine, or by some other agency; and, lastly, worked up into a pulp as in the common method. It does not seem, however, that paper made of straw by either of these methods, or by any other, has maintained its standing, at least in this country.

The French, some years back, devised a mode of converting to a useful purpose the *boom*, or central stem of the hemp and flax plants. This boom, after the removal of the fibres which form the well-known flax and hemp, is commonly used as manure; but an attempt has been made to work it up into coloured paper. This paper was, however, found to be tender and weak, and has not been much heard of.

Supply of Water to Marseilles.—A highly important hydraulic work has been projected, and is now in rapid progress of execution under the able direction of M. de Montricher. This canal will derive its water from the Durance, near to the suspension bridge at Pertuis, and this will be conducted by open cutting and tunnelling for a distance of fifty-one miles, through a most mountainous and difficult country, until it reaches the land territory of Marseilles, where it will be employed for the supply of the city, as well as for irrigation, and giving activity to various branches of industry which require water-power. The section and fall of this canal is calculated to pass eleven tons of water per second, and its levels are so disposed that this quantity of water will arrive near to the city, at an elevation of four hundred feet above the level of the sea. Perhaps no work of this description has been attempted either in ancient or modern times more hardy in its conception, or more really useful in its effects. Three chains of limestone mountains are already nearly pierced by the ten miles of tunnels which are required to conduct this stream; and an aqueduct, which is to convey it across the river Arc (about five miles from Aix), is now in construction. Its elevation above the river will be two hundred and sixty-two feet, and its length across the ravine one thousand two hundred and thirty feet. The design for this gigantic structure is in excellent taste, and as a work of art it will not suffer from comparison with the famous Pont du Gard, which it will much surpass both in altitude and size. The estimated cost of this canal is about 450,000*l.*, and this sum is raised by the city of Marseilles without aid from the government. The revenue arising from this work will be principally from supplying water for irrigation, as the value of land in such a climate is quadrupled if water can be so applied to it.—*Murray's Hand-book for Travellers in France.*

Pottery in India.—We were amused here (at Harike) at observing a man making pottery, which he performed in the most simple manner possible. In the centre of a circular hole, two feet and a half deep by as many in diameter, a wooden staff was inserted, and upon this, close to the bottom, but not touching it, was a solid wheel of wood, whilst another of smaller dimensions was fixed nearer to the top. The whole of this apparatus was planted perpendicularly into the ground, and the man, sitting on the edge of the cavity, worked the larger wheel with his foot, whilst with his hand he moulded the clay placed on the smaller one (which was turned with the former) into whatever form he required. We saw him construct a utensil somewhat in the shape of a flower-pot, and he finished it in a very neat manner in less than five minutes. The poor fellow, who was miserably clad, complained bitterly of the cold; but this was not to be wondered at, for, independent of his ragged costume, he had to dip his hands into water every fifteen or twenty seconds, and the weather was very much inclined to be more than chilly in its influence.—*Lieut. W. Barr's Journal of a march from Delhi to Peshawur, &c.*



[1, Quercifolia; 2, Pavonia; 3, Quercus; 4, Lanestris; 5, Caja; 6, Villica; 7, Castrensis; 8, Versicolora.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

British Moths—*continued.*

The examples of the genera of British moths which we have selected for notice, and of which figures are here given, are the Lappet moth, the Emperor moth, the Oak Egger moth, the Small Egger moth, the Great Tiger moth, the Cream-spot Tiger moth, the Ground Lackey moth, and the Glory of Kent.

We shall not attempt to enter into the minutiæ of distinctive characters, which are presented by the respective genera to which they belong, a procedure which would lead us into details interesting indeed to the entomological student, but not to be appreciated by the general reader; rather let it suffice us to describe them as simply and clearly as possible, with such an account of their general habits as our space will admit, remembering that our object is to allure to the study of the works of nature, and to point out important and pleasing facts, rather than to teach the groundwork of any branch of science.

1. The Lappet moth, Perfect Insect, Caterpillar, and Chrysalis (Gastropacha Quercifolia). The Lappet moth seems to vary considerably with respect to the numbers in which it makes its appearance, being rare during some seasons, and abundant in others; in some districts, moreover, it is in greater plenty than in others. It is stated to be of frequent occurrence about Hertford in the lanes and along the hedges, where the leaves of the sloe afford food to the caterpillar.

The Rev. L. Jenyns observes, that in the month of May, a few years since, he observed the larva of this moth in great abundance on the willows in Bottisham and Swaffham fens, and that he had in previous years seen this insect, both in the caterpillar and winged state, frequenting the same locality. Mr. H. Doubleday gives Epping as one of the spots where it is to be met with; and Mr. Stephens, the lanes about Combe Wood, near Richmond, Surrey.

* The name of Lappet moth is taken from a peculiarity in the caterpillar, which has each segment furnished with fleshy lateral appendages or lappets; and though the term is only applicable to the caterpillar, it has been transferred to the perfect insect, and universally adopted.

The sexes of this moth vary considerably; the body and antennæ are dusky, or of a deep ferruginous brown; the wings are of the same tint, the anterior pair having three oblique waved dusky stripes and a central black spot, the hinder pair are unspotted. The female exceeds the male in size, and is of a lighter hue gene-

rally, with the stripes darker. Occasionally the stripes are almost obsolete; sometimes remarkably broad and deep: and occasionally the posterior wings have a few dusky markings. When at rest, the wings are deflected, and the moth resembles a withered oak-leaf in form and colouring.

The caterpillar is of a large size, of a dusky colour with a rufescent tinge; the nuchal segments are ornamented with patches of blue, and a double series of white and red spots runs down each side: it feeds on the whitethorn, sloe, willow, rose, &c. When about to undergo its chrysalis or pupa change, it surrounds itself with a powdery web: the pupa is brown, with red fasciæ. The perfect insect appears in July.

2. The Emperor moth, Perfect Insect, Caterpillar and Pupa (Saturnia Pavonia).

Heaths and marshy places are the haunts of this beautiful moth, of which the males may be often seen during the warm afternoons of summer, playfully flitting about, in quest of their less active mates. This species is by no means uncommon, and is rather widely spread; we have captured it in garden-grounds on the Surrey side of the water near the chain bridge at Hammersmith. It occurs also in the hollow of Combe Wood near Richmond; in Horningsea and Swaffham fens; on the heaths near Scarborough; and various other localities.

The Emperor moth is of considerable size, measuring two inches six or ten lines in the expanse of the wings, the female often exceeding three inches.

In the male the body is fulvous; the anterior wings are griseous, powdered with whitish, and with three purplish stripes edged with black. Between the two anterior stripes is an ocellated spot, of large size, with a black pupil, a white ring, encircled with black, and a bluish lunule towards the base of the wing. The apex of the wing is purplish, with a few black, white, and rufous spots. The hinder wings are tawny, with a ferruginous tinge, and an ocellated spot very closely resembling that on the anterior wings. The female is of a paler colour generally; but both sexes vary in markings, and sometimes in the female the wings are beautifully suffused with purplish.

The caterpillar is gregarious, and feeds on the heath, blackthorn, alder, oak, willow, birch, &c., and also on the leaves of the strawberry.

When very young its colour is black, but afterwards it becomes green, annulated with black, and with verticillated hairy red and yellow tubercles on each black band. In the autumn it encloses itself in a hard pyriform cocoon, covered with brownish down; the pupa is brown and very obtuse. The pupa in its cocoon and out of this covering is represented. It would appear that the pupa often lies two seasons before it accomplishes its last change; the perfect insect emerges in April or May, and sometimes not until August. The wings are broad, and horizontally extended, and are well formed for vigorous flight.

The Oak Egger moth, Caterpillar and Perfect Insect (Lasiocampa Quercus).

In the New Forest, Hampshire, in various parts of Devonshire, and certain isolated localities, this moth is not uncommon, while in other localities it is rare. It is only to be met with occasionally in the neighbourhood of London. In the extent of its wings it nearly equals the Emperor moth; and, as in that species, the male often flits about during the sultry afternoons of summer.

The general colour of the male is deep chesnut brown; the wings have a broad yellow band margined abruptly on the inner edge, and gradually shaded off towards the hinder margin of the wing, which has a broad brown fringe; the anterior wings have a central spot of white, usually of a triangular form, and a conspicuous yellow patch at the base. The female exceeds the male in size, but the general tints are paler: both sexes are subject to variations of colour.

The caterpillar is ochraceous, with black rings and white streaks on the sides: it feeds on the oak, ash, sloe, whitethorn, &c.; and in the pupa state is enveloped in a dusky cocoon. The perfect insect appears in August.

4. The Small Egger moth, Caterpillar and Perfect Insect (Eriogaster Lanestris).

This species is common in different localities around London, as in Darent and Combe Woods; it is found also in Essex, Cambridgeshire, and other counties—abounding some years and rare in others. Occasionally nests of its caterpillars may be seen in the hedges, for the caterpillars, or larvæ, are gregarious, and make a common tent, in which they crowd together; this they enlarge from time to time, leaving it during the night, when they search for food, and returning to it in the morning at daybreak. Before assuming the pupa stage they quit this silken tent, and seek the surface of the ground, where they enclose themselves in an oval rigid cocoon, whence the perfect insect emerges in the months of February and March.

In the moth the thorax is griseous; the abdomen fuscous, with a paler apex; the anterior wings are subferruginous, with a large white spot at the base, and, in the male, a dark cloud in the centre, and an incurved white line beyond a central white spot; the hinder margin ashy grey. The hinder wings are grey, with an obsolete central line of white. Extent of wings one inch two or four lines. The colour in both sexes is subject to variation.

The caterpillar is black or brownish, with two red patches on each segment, between abbreviated subannular white streaks, and a yellowish lateral line. It feeds on the leaves of various trees, as the whitethorn, willow, lime, and fruit-trees.

5. The Great Tiger moth; Caterpillar, Pupa, and Perfect Insect (Arctia Caja).

The Tiger moths (Arctia) are remarkable for the brilliant and showy contrasts of their colouring, which render them very attractive: The body is stout and robust; the larvæ are solitary, thickly clothed with long pencils of hairs, each pencil arising from a tubercle; when touched they roll themselves into a ring. The pupa is inclosed in a loose extended web.

The Great Tiger moth is a very beautiful species, and is everywhere in tolerable abundance. It is subject to considerable variety in the arrangement of its markings, and its tints; indeed Mr. Stephens, who describes nine varieties, observes, that of this Protean species there are scarcely to be found two specimens which agree precisely in colour and markings. In general the thorax is brown, with a narrow white ring anteriorly; the body reddish white, or red, fasciated with black. The anterior wings are ornamented with white or cream-colour, and black or brownish black in distinct abrupt patches; the hinder wings are red, with glossy bluish black marks. The caterpillar is black, hirsute, with three bluish tubercles on each segment laterally. It feeds on various plants, as lettuces, chickweed, &c. The moth appears in spring.

6. The Cream-spot Tiger moth, Caterpillar and Perfect Insect (Arctia Villica). This elegant moth is rare in some districts, but common in others. It is not unfrequently taken in the woods of Middlesex, and in Surrey, Kent, Essex, &c. The Rev. L. Jenyns observes it is rare near Cambridge. Like the preceding species it is subject to considerable variation of colouring. Generally, however, the anterior wings are black, relieved by several abrupt white spots of different sizes; the hinder wings are yel

lowish, more or less spotted with black; thorax black; abdomen rufous, with a dorsal and lateral series of black spots. The caterpillar is dusky, with blackish hairs and fulvous tubercles; the head and legs are red. It feeds on various plants, but prefers chickweed. The perfect insect appears in June or July. The males are frequently seen abroad on the wing in the afternoon, during warm weather; but the female is indolent in its habits.

7. The Ground Lackey moth, Caterpillar, Pupa, and Perfect Insect (Clisiocampa castrensis). In the genus Clisiocampa the wings are very acute at the apex, reversed when at rest, short in the male, elongate in the female. The larvæ are gregarious, wandering about irregularly in troops, and frequently changing their silken tent. Before assuming their pupa state, they separate, and retire each to some retreat. The pupa is inclosed in a double web of powdery silk. This species of moth seems to be limited to certain districts in our island, as the coasts of Essex, Kent, and Devonshire, and the Isle of Sheppey, being littoral in its habits, and never found in the Midland counties. It varies considerably in its markings. The thorax is yellowish, the abdomen tawny; the anterior wings of a straw-colour, with two tawny or chesnut stripes, sometimes united, sometimes forming two distinct bars across the wing. The posterior wings are fawn-coloured, with an obscure streak across. The female is larger, and of a darker colour. The caterpillar is hairy, and bluish, with irregular red and black streaks above, and red lateral lines. It feeds on various plants, as sea-wormwood (Artemisia maritima), birch, plantain, carrot, &c. It undergoes its pupa change in July, and the perfect insect appears in August.

8. The Glory of Kent, Caterpillar, Pupa, and Perfect Insect (Endromis versicolora). This beautiful little moth is very local in its range in our island, and by no means common in any district. Mr. Stephens says that for several successive years he found the larvæ at Darent Wood, and succeeded in tracing their progress to perfection. He has also seen the perfect insect three or four times in April at Combe Wood, flying in the afternoon. It occurs in Devonshire, Sussex, and Kent; and we are informed by Mr. Stone that it was found some years since in tolerable abundance in Ashdown Forest, Sussex, in the pupa state. It has been taken near Ipswich.

In the male, the thorax is white and fulvous, the body fulvous, with a black patch on the second segment. The anterior wings are grey, with two dusky stripes across, with a black lunule between them. At the apex of the wing are three triangular, semitransparent, white spots, and each nervure has a dilated whitish streak. The posterior wings are orange-tawny, with an undulated dusky stripe and central lunule; there is also a dusky patch on the anterior margin bordered with white. The female is larger than the male, and of a paler colouring. Expansion of wings two inches and four or six lines; it often exceeds three inches.

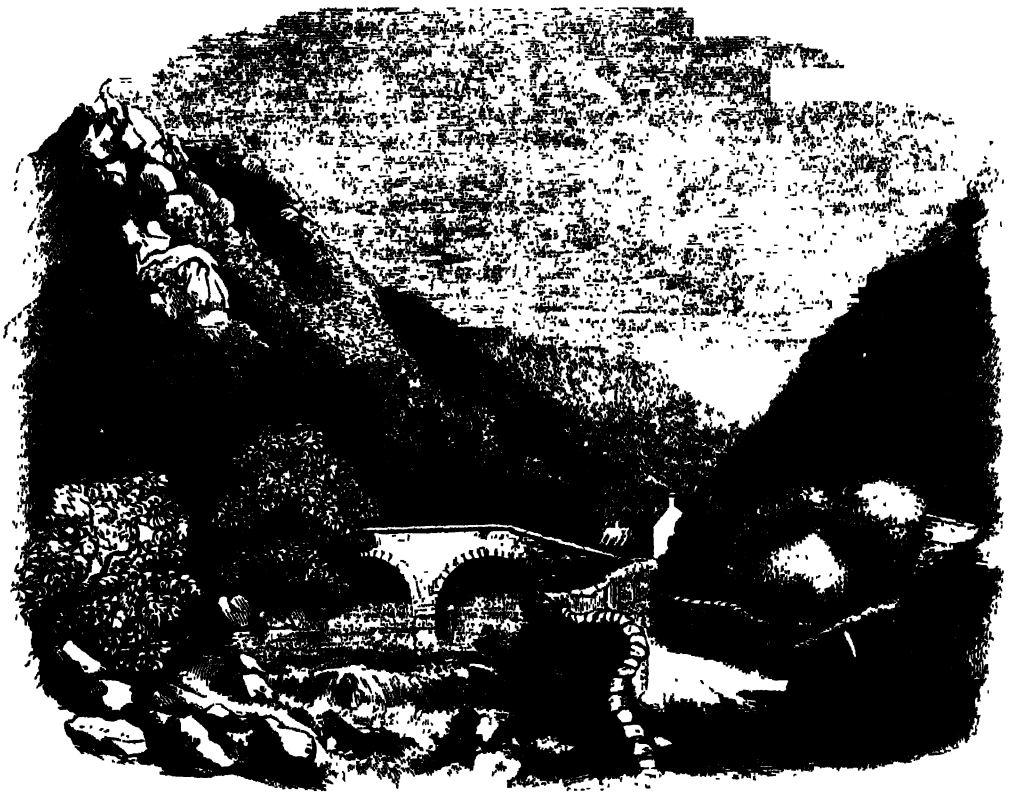
The caterpillar is naked, with a pyramidal elevation on the last segment. Its colour is green, minutely speckled with black below: the sides are ornamented with oblique lines, and on the three anterior segments there is a longitudinal line of the same colour. Anterior legs and tail yellow. The pupa is brown. The food of the caterpillar consists of the leaves of various trees, as the beech, lime, birch, hazel, &c. The perfect insect appears in April, and has in many points the habits of the Emperor moth, the males appearing on the wing during the afternoon.

We have noticed the cocoon of the Emperor moth, which is somewhat of the shape of a Florence flask, but is not closed at either end, which presents us with a minute circular aperture, formed by the convergence of little bundles of silk gummed together, and almost as elastic as whalebone. By the convergence of these needle-like points, these entrances are effectually protected against intrusion: but, besides this, there is within a close silken netting, so as still more effectually to bar access to the chrysalis. The external surface of this cocoon is so closely woven that it appears like damask; and yet, though impenetrable from without, the moth, when it issues from its pupa-case, easily emerges from its silken envelope, the elastic threads giving way when pushed from within, and the opening reclosing, from the elasticity of the fibres, when the moth has made its exit. When Rosel saw a moth of this species emerge from the cocoon, which, when he came to examine it, appeared as if the insect had not left it, he was for some time considerably puzzled. Caterpillars which spin a light web generally remain in the pupa state for a much shorter period than those which shroud themselves in close and well-compacted envelopes. The cream-spot tiger moth, for instance, which lies in the pupa state only three or four weeks, is surrounded by a light open web of fine threads loosely intertwined, through the fabric of which the pupa is visible. The same structure of cocoon is found in other species. The Ground Egger moth, which remains in a pupa state throughout the winter, constructs a hard shell-like cocoon, resembling the dingy egg of a small bird, with a few fibres of silk interspersed through its substance; it is usually seen to be perforated with one or two little orifices like pin-holes, the use of which does not appear to be well understood. It has been suggested that they may serve for the admission of air; yet in the instance of the Oak Egger moth, which forms a similar cocoon, no such air-holes are to be detected. Yet it is certain that the caterpillar of the former leaves these apertures when constructing the domicile in question, as it has been watched in the performance of its labours.

LYNMOUTH AND LYNTON.

The range of hills which extends from Exmoor to Morte Bay, in the north of Devonshire, presents a variety of the most wild and picturesque scenery, especially in the vicinity of Lynmouth and Lynton. Along the coast, the cliffs are mostly high and craggy; inland, the country consists of mountains and valleys, broken up in the most irregular manner into rugged downs, rocky hills clothed with oaks and underwood, deep glens and hollows with great gaps apparently opening on precipices forbidding further progress, vast knolls, and lofty piles of rock, from which hang tufts of foliage. The whole country, indeed, is of this character, all the way from Ilfracombe with its beautiful natural basin surrounded by craggy heights covered with foliage, to Combe Martin with its dale of magnificent scenery extending a mile in length to the shore of the Bristol Channel, and eastward through the Valley of Rocks, to Lynton and Lynmouth.

The mountains between Combe Martin and Lynton present a sublime outline, and assume positions which are highly picturesque. Among the glens with which the whole surface of the country is furrowed, there is one in this neighbourhood of a very extraordinary character and aspect, on which the people of the country have bestowed the appropriate name of the Valley of Rocks. This valley commences about five miles from Combe Martin, extends about a mile in length, and terminates about half a mile from Lynton. It is generally from 200 to 300 yards wide. The devious and difficult track from Combe Martin, which has conducted the traveller through a variety of strange



[Lynmouth Bridge.]

and picturesque scenes, suddenly winds downwards, when foliage and verdure disappear, and he enters the valley, which appears to be walled in by large fragments of rock piled on each other, sometimes forming rude natural columns, while high overhead the masses are so arranged as to resemble extensive ruins overhanging the rugged pass. Great blocks of stone are scattered over the valley. In one part there is a vast isolated pillar, formed of masses of rock so placed as to preserve the direction of the grain throughout, and nicely fitted to each other, as if it had been a work of art, though it has doubtless been so left in the convulsion which formed the valley. There is every appearance of a vast and impetuous torrent having swept through it in a western direction, tearing the rocks from the mountains and hurling them along as it rushed through the broad gaps which still open upon the Bristol Channel. On approaching the wide outlet towards Lynton, traces of cultivation appear, and dispel the feeling of solitude and seclusion which the silence and ruinous aspect of the valley had inspired.

The village of Lynton is situated on a hill 430 feet above the level of the sea, and parts of the range attains to a height of 1000 feet. The scenery around is of the most bold and romantic character. The view from the churchyard extends over the Bristol Channel, and is lost among the mountains of South Wales, while the interior affords a varied prospect of rocky and wooded hills and valleys.

The village of Lynton is included in the parish of Lynton, which is itself included in the hundred of Sherwill. The population of the parish in 1841 was 1,027. The parish church at Lynton has accommodation for 350 persons. The living is a perpetual curacy united with Counteabury, in the gift of the Archdeacon of Barnstaple, and of the average annual value of 108*l*. The original parsonage-house, a singularly rude and antique structure, is represented in the annexed wood-cut. It was built in 1566, and was used as the parsonage-house till the commencement of the eighteenth century, when Mr. Browning became the incumbent, who, being a man of property, built a larger house near the old one. Being anxious, as a good shepherd, to collect his flock together before the Sunday services, he used to ride about the lanes in the neighbourhood of the Valley of Stones, in order to gather in the stragglers. He died in 1733. His successor resided in the old parsonage-house, and it is uncertain when it ceased to be the abode of the clergyman. Mr. Browning's house was pulled down a few years since, and the present incumbent, Mr. Mundy, has erected a handsome house on or near its site, in striking contrast with the old parsonage-house beside it, which is now called Ivy Cottage, and, with its stone staircase and diminutive windows, has an air of great antiquity inside; outside, geraniums in full blossom have been seen flourishing beneath its shade in the month of December.

The eastern side of the hill on which Lynton is situated exhibits a finely-broken outline richly clothed with brushwood. A zig-zag and precipitous road leads downwards to the village and port of Lynmouth, a short distance to the east of Lynton. The situation of the village of Lynmouth is extremely sequestered and romantic, seeming to crouch at the feet of the rocky hills which surround it on every side, except where the little flat on which it stands unites with the shore. The houses are not built in groups or lines, but are separate, and are mostly concealed from each other by trees and high hedge-rows. The two small rivers, the East Lyn and West Lyn, rush from dark ravines in the craggy



[Lynton Parsonage.]

heights to the east and south of the village, and dashing onward over their rocky beds, each passes under an ivy-mantled stone bridge, and here unite their waters. A short distance below the village a small pier for the use of small coasting and fishing vessels forms a sort of sea-port in miniature, whence Lynmouth oysters and herrings and oats are exported, and which receives coals and other necessaries for the inhabitants of Lynmouth and Lynton, and the neighbouring districts. There are lodging-houses in the village for visitors who resort there in the summer for the benefits of sea-bathing and sea-air.

To the east of Lynmouth is a mountain with a precipitous descent to the sea, which breaks against the rocky coast several hundred feet below. The road to Lynmouth, which seems to creep along the face of this prodigious down, is narrow, rugged, and unguarded by a low wall or even a rail. The traveller, unaccustomed to such a perilous path, guides his horse down with fearful caution, trembling at the imagined possibility of the animal stumbling or becoming restive, and hurling himself and his rider down the deep descent to inevitable destruction. The Devonshire peasant, on the contrary, accustomed to travel over it, trots downward on his laden horse as fearlessly as he would on a level turnpike-road.

LORENZO DE' MEDICI.

[Concluded from p. 220.]

The family of the Pazzi was one of the noblest and richest in Florence; the leading members of it were known to be jealous of the authority of the Medici, and to have no friendly feeling towards them; but the two families lived on terms of external civility and some degree of intimacy. Guglielmo de' Pazzi was the husband of Bianca, the sister of Lorenzo and Giuliano de' Medici, and Giacopo de' Pazzi, the eldest of the family and the head of it, was under obligations to Lorenzo, of which his letters of acknowledgment are still extant. Giacopo was somewhat advanced in years, and appears to have been a dissipated man, and much disliked by the people of Florence. Francesco, who was probably the originator of the plot, was a nephew of Giacopo; he was of a bold and ambitious character, and was apparently stimulated by some secret motive of revenge as well as by the hope of transferring the authority of the state from the Medici to the Pazzi. Francesco lived at Rome, where the Pazzi had a bank, and the pope transferred the office of treasurer to the Holy See from Lorenzo de' Medici to Francesco de' Pazzi. The causes of the pope's enmity have been explained. Salviati had recently been appointed Archbishop of Pisa, which city was included in the territory of Florence, and the Priori of Florence, probably under the influence of Lorenzo, who disliked the man's character, refused to sanction the pope's appointment. Count Girolamo seems to have been actuated merely by profligate ambition and the influence of his friend Francesco de' Pazzi.

The plan of the conspiracy was arranged with great precaution, and conducted with the utmost secrecy. Two thousand of the pope's soldiers were put in march to approach Florence by different routes, and to be ready to support the conspirators. Meantime Cardinal Riario, nephew of Count Girolamo, a young man recently appointed by the pope to this high dignity, was requested by the Archbishop Salviati to meet him at Florence, whither the cardinal repaired, and took up his residence at a seat of the Pazzi near the city. Lorenzo de' Medici was then residing at his country-house at Fiesole, where, as the conspirators expected, he prepared a splendid entertainment for the cardinal, to which the leading members of the Pazzi family were also invited. It was arranged to assassinate the two brothers while the conspirators were partaking of their hospitality, but Giuliano was absent from indisposition, and the plan was thus frustrated. As, from the great number of persons acquainted with the conspiracy, there was much risk of discovery, it was resolved to perpetrate the deed at a solemn religious ceremony which was to take place in a day or two in the church of the Riparata, afterwards called Santa Maria del Fiore, but since best known as the duomo or cathedral of Florence. Another difficulty now arose: Giovan Battista Montesecco, one of the condottieri in the pope's pay, who had undertaken to be one of the assassins at Fiesole, refused to commit murder in a church. Two ecclesiastics, however, were found, Antonio Maffei, a priest of Volterra, and Stefano da Bagnone, one of the apostolic scribes, whose consciences were not so delicate as that of the rough soldier. It was now arranged that at the moment of the elevation of the host, these two priests should attack Lorenzo, while Francesco de' Pazzi and Bernardo Bandini, a daring and desperate libertine, should assail Giuliano.

On the 26th of April, 1478, Lorenzo de' Medici invited the cardinal and his suite to his palace in Florence, whence they proceeded together to the church. Another difficulty now occurred. The service had already commenced, and Giuliano was not yet present. Francesco de' Pazzi and Bandini therefore left the church, and went to his house to hasten his attendance. He was unwell, but went with them. They were apprehensive that his delay had been caused by suspicion, and as he walked between them, they put their arms round him as if in jest, but in reality to feel if he had armour under his clothes. He was totally unarmed, and had not even his dagger or sword. They entered the church as the sacred ceremony was proceeding: not long afterwards the host was elevated, and as the people bowed their heads in adoration, Bandini struck Giuliano with a short dagger. The blow was well aimed. Giuliano staggered a few paces and fell dead. Francesco de' Pazzi immediately flung himself on the body, and stabbing it with blind fury, wounded himself severely in the thigh. The two priests had attacked Lorenzo at the same moment as Bandini struck Giuliano; but Antonio Maffei uttering the word "traitor" as he raised his dagger, Lorenzo became aware of his danger, drew his sword, flung his cloak over his left arm as a shield, and stood on his

defence, but not before he had received a wound in his neck. The priests were intimidated and fled; not so Bandini; he advanced towards Lorenzo; the crowd

"gave way before the stride
Of the undaunted homicide;"

but Francesco Nori, a friend of the Medici, stood in his way, and another instantaneous death followed the plunge of Bandini's dagger. Shrieks, shouts, and a scene of indescribable confusion now filled the church. Lorenzo's friends hurried him into the sacristy and fastened the door, and, as apprehensions were entertained that the assassin's dagger might have been poisoned, Antonio Ridolfo, a young man belonging to a noble family at Florence, sucked the wound.

When the attack was made on the Medici, the Archbishop Salviati, with about thirty followers, had, as agreed upon, left the church, and proceeded to the government palace, where Cesare Petrucci the gonfaloniere and the Priori were sitting. Salviati's intention was to overpower the magistrates, and seize the palace. Leaving his followers in the outer rooms, with directions to follow him when he made a signal, he entered the apartment of the Priori. Petrucci, as a mark of respect, rose to meet the archbishop, who, intimidated probably by his lofty bearing and resolute character, was disconcerted, spoke almost unintelligibly, changed colour, and looked round anxiously towards the door, seeming to make a signal. Petrucci's suspicions were aroused. He rushed out of the apartment, and called the guards and attendants. The archbishop attempted to escape, but the doors of the palace were secured against him and his followers, who were attacked and overpowered. A number of them, who ought to have obeyed the archbishop's signal, had unintentionally fastened themselves in the adjoining apartment, the door of which was so contrived as to shut on the slightest impulse and not to open without a key.

Giacopo de' Pazzi was now seen without, followed by about one hundred soldiers, vainly endeavouring to incite the populace to insurrection, while the palace gates were forced by others; but the magistrates were able to defend themselves till a reinforcement came to assist them.

The citizens were aroused by the tolling of the great bell of the palace, and everybody was soon aware of the assassination and conspiracy. The rage of the people knew no bounds. Every one known to belong to the party of the conspirators was slaughtered in the streets. Lorenzo, who had been escorted to his palace by a crowd of his friends, addressed the people from a window, and exhorted them to be temperate, and to leave the punishment of the guilty to the magistrates; but his exhortations were of little avail. The populace, with the head of a conspirator on a pole, paraded the city, crying out "Palle, Palle,"* and "Death to the traitors." The Priori themselves were hardly more temperate than the people. Francesco de' Pazzi was taken from his bed, where he was confined by his wound, and dragged naked through the streets to the palace, and, together with the Archbishop Salviati, in his prelatical robes, hung from one of the windows. Giacopo de' Pazzi and Renato de' Pazzi were treated in the same manner. Guglielmo de' Pazzi was concealed by Lorenzo in his own palace till the popular fury had subsided. He was afterwards ordered to reside at his country-house, twenty-five miles from Florence. The two priests were discovered in the Benedictine Monastery, and were dragged out and murdered. Montesecco was executed after having disclosed the whole plot, implicating the pope and his nephew Count Girolamo. The Cardinal Riario was set at liberty. Bandini, the chief assassin, had passed beyond the boundaries of Italy, and was apparently safe in Constantinople. He was not safe. The sultan had heard of the transaction. Bandini was seized, and sent in chains to Florence, where he was executed. The whole of the Pazzi were banished, and the very name and arms of the family were ordered by a public decree to be suppressed and obliterated wherever they existed in the city.

The failure of the plot, and not less perhaps the exposure of his own participation in it, incensed the pope to the utmost degree. He launched his thunders against the devoted Florentines, laid them under an interdict for having dared to hang an archbishop in his robes, and in conjunction with the king of Naples declared war against them. Lorenzo prepared to meet the coming storm in the best manner he could; he collected supplies, solicited assistance from other Italian states, and applied to France and Spain for their interference in his behalf. For some time his efforts appeared likely to be successful. The Florentines were stimulated by indignation, and were high in hope and courage. The enemy's forces were defeated in some places and repulsed in others; but by degrees they began to lose heart, and to imagine that they were too weak to contend with the powers that were leagued against them. Murmurs became loud that the city had been involved in an expensive war for the sake of Lorenzo alone. Under such circumstances he acted as became a man of resolute character who thinks and decides for himself; he resolved to go in person to the king of Naples, and either to make him the friend of Florence or run the risk of being sacrificed by his enemies. He wrote to the magistrates of Florence (the letter is yet extant) to inform them of his resolution. "All that I desire," says he, "is, that whether in life or in death, in prosperity or adversity, I may contribute to the welfare of my native place." "The war was begun by the shedding of my brother's blood. It may perhaps be ended by the shedding of my own." The stern Priori were moved to tears by the reading of the letter.

Lorenzo embarked at Pisa, and when he landed at Naples was received by the king with great respect. His arguments, his eloquence, and his pleasing manners were effective in spite of the pope's efforts to counteract them. After a stay of three months—three anxious months to the poor Florentines—a treaty of peace and mutual defence was concluded with the king of Naples, and Lorenzo immediately set sail for Pisa, whence he hastened to Florence. The joy of the Florentines was unbounded. All ranks crowded around him. His intimate friend Politian could not get near him, but describes him as towering above the living mass by his superior stature, and expressing his sense of their kindness by smiles, and nods, and broken sentences.

The war was now at an end. The Pope, however reluctantly, was compelled to conclude a treaty of peace with Florence, and a deputation of twelve of the most respectable citizens was sent to Rome to tender their submission to his holiness, who, after giving vent to his anger in some severe remarks on the irreverent conduct of the Florentines, touched the backs of the deputies with a wand, according to the usual ceremony, and released the city from the interdict.

The personal danger of Lorenzo de' Medici was not yet at an end. Girolamo Riario, defeated in his treacherous and ambitious designs, had again recourse to assassins. Battista Frescobaldi, Filippo Balducci, and Amoretto Baldovinetti undertook to murder Lorenzo in the church of the Carmeli on Ascension day, May 31, 1481; but the friends of Lorenzo were on their guard:

* Palla, in Italian, signifies a ball. By the plural palle, balls, was meant the six golden balls, which were the arms of the Medici.

the conspiracy was discovered: Frescobaldi was seized, confessed his guilt, disclosed his associates, and on the 6th of June they were all executed. Girolamo Riario was himself assassinated in 1488. Having rendered himself universally odious by his oppressions, three of his own subjects stabbed him in his own palace, and threw his body out of the window.

During the period which elapsed from the time of Lorenzo's return from Naples in 1480 till his death in 1492 there were several wars among the states of Italy, in some of which the Florentines found it necessary to engage; but Lorenzo de' Medici was a friend of peace, and never interfered except to strengthen the weaker states and to protect them when attacked by the stronger. For this purpose he not only used the resources of Florence, but employed all the arts of political negociation, forming defensive and offensive alliances, in such a manner as not only to secure his own state against his more powerful neighbours, but to preserve the independence of the smaller states. He thus became the common mediator of Italy. His reputation extended throughout the civilized world, and this system of union, which he was the first to adopt, became the origin of what has since been called the balance of power.

Lorenzo had for some years suffered under a complaint which in the early part of 1492 became worse; a slow fever supervened, and he died at his house at Careggi on the 8th of April, 1492. The news of his death created not only universal grief but consternation, as if the safety of the city and state depended on his superintendence, which unfortunately proved soon afterwards to be too true. He was buried in the church of San Lorenzo, and there his remains still rest without a monument or even an inscription.

Lorenzo de' Medici left three sons. Piero, the eldest, who succeeded him as head of the Medici family, was born February 15, 1471. He brought evil upon the state of Florence, and deservedly upon himself. Giovanni, who was born December 11, 1475, become pope, with the title of Leo X. Giuliano, who was born in 1478, having allied himself by marriage with the royal house of France, obtained the title of Duke of Nemours.

RAMBLES FROM RAILWAYS.

The Lea.—No. IV.

The scene of Izaak Walton's inimitable book is laid along the banks of the Lea between Tottenham and Ware: that is, along that portion of our river we are now to ramble beside. We have in these papers more than once quoted from the 'Complete Angler,' and we cannot refrain from availing ourselves of so fair an opportunity of venturing a few remarks on it and its author. According to Drayton:—

"The old Lee brags of the Danish blood,"

but it brags more loudly now of the name of Izaak Walton, to whom indeed it chiefly owes the celebrity of its own name.

Izaak Walton is a remarkable instance of what may be effected when out of the fulness of the heart the mouth speaks:—from taking up the pen not merely to fill a few sheets but because there is somewhat to communicate. We meet with nothing profound in his reasoning—a light plummet will sound its lowest depths; nothing in his general remarks that had not been said before and that has not been said a hundred times since; and of course there is little in the main subject of his book that is generally interesting; yet there is not a man with the least pretension to literary taste but reads the 'Complete Angler' with genuine enjoyment. It is probably the only volume professing to be a mere guide to any particular pastime that, after nearly two centuries, has retained a spark of vitality:—yet, although that time has passed away since the first edition was published, it is now read with as much freshness and pleasure as when it first appeared.* Undoubtedly it is not what concerns angling that renders the work so attractive, yet whoever makes the acquaintance of Izaak Walton will assuredly, like *Aucepe*, "part with him full of good thoughts, not only of himself but of his recreation." Not that Izaak would have been pleased to think that any reader would pass lightly over what he wrote on his favourite art, or think meanly of it; he will not bate one jot of the dignity of angling: "for angling," he tells us, "is somewhat like poetry—a man must be born to it;" while the felicities of its practice he rates equally high:—"no life so happy and so pleasant as the life of a well governed angler; for when the lawyer is swallowed up with business, and the statesman is preventing or contriving plots, then we sit on cowslip banks, hear the birds sing, and possess ourselves in as much quietness as these silent silver streams which we now see glide so quietly by us. Indeed, my good scholar, we may say of Angling as Dr. Boteler said of strawberries, 'Doubtless God could have made a better berry, but doubtless God never did:' and so, if I might be judge, 'God did never make a more calm, quiet, innocent recreation than angling.'"

Walton's argument in favour of angling is most singularly managed; and the variety of topics and illustrations brought in to support it are not the least singular portion. Nothing that can be introduced is omitted. Everybody who can in any way be made to uphold, or do honour to, angling is constrained to appear, from Deucalion and Belus to Sir Henry Wotton; and from Seth and Moses to Nat. Roe: and every river from "that in Arabia of which all the sheep that drink thereof have all their wool turned into a vermilion colour," to that "in Judea that runs swiftly all the six days of the week and stands still on the Sabbath." while of fish we have all that is wonderful recorded, from "the Balæna or Whirlpool that is so long and broad as to take up more in length and breadth than two acres of ground," to "the fish called a Hermit, that at a certain age gets into a dead fish's shell, and like a hermit dwells there alone, studying the wind and the weather, and so turns her shell that she makes it defend her from the injuries that they would bring upon her." And much more of the like kind have we told us, sometimes in evident good faith, sometimes with a quiet half incredulous smile, hardly less charming.

What renders Walton's angler so delightful a book is the happy spirit in which everything is communicated. There is a lively freedom and point about every part—a directness and earnestness in the arguments, a quaint grace and facility in the descriptions of scenery, a simplicity and kindness in his notices of his companions, and a still humour intermingling everywhere with a cheerful seriousness, such as are hardly to be met with so happily blended in any other work. It is the perfect counterpart of the agreeable gossip of an intelligent, frank, and light-hearted old man. And it adds not a little to the pleasure of reading it to know that it is just what it seems to be. Just the every-day chit-chat of an old man who loved his angle and his book, and a little innocent pleasantry with a fitting companion. Walton wrote the Complete Angler when he was near sixty, and there is all the freshness of a new taste about it. One might imagine it written when his mind was buoyant from its escape from "the shop near Chancery-lane," and under

* The first edition of the 'Complete Angler' was published in 12mo., in 1653.

the exhilarating influence of those feelings that result from an unrestrained intercourse with nature after a long absence from her. His descriptions are quite in the spirit of one

> "who, long in populous cities pent
> Where houses thick and sewers annoy the air,
> Forth issuing on a summer's morn to breathe
> Among the pleasant villages and farms
> Adjoin'd, from each thing met conceives delight:"

and the gentle enthusiasm with which he dwells on such spots as are within the reach of every one who is minded to taste of "true nature's grace" is quite infectious. He speaks with as much minuteness of the sedgy bank of a quiet stream as Cowper, and with far more zest. He had the eye and the mind of a poet, and if he had written poetry in early life, perhaps he would have equalled in delicacy of touch and exquisite sweetness of diction the best verses of "holy Mr. Herbert," whose poetry delighted him so much, and whose character had so many points of similarity as well as of dissimilarity with his own. But we ought not to regret that he did not direct his attention more to poetry, seeing that he has left us an unequalled example of artless colloquial prose. Here his style is quite his own. Familiar with the writings of his contemporaries —who were the best writers of prose England ever possessed—he imitated none, but formed for himself a style free, facile, and pliable, accommodating itself without difficulty to every turn of his thought—now running lightly along in unlaboured prattle, and in a moment striking into a fuller and deeper note. Easy and unlabboured as his style appears it was not easily acquired: nor did he allow himself to be readily satisfied with it; but, to use Milton's phrase, "took time enough to pencil it over with all the various touches of art." He lived to see five editions of the 'Angler' published, and in every one after the first he altered and amended not merely the substance but the phraseology. Sometimes he merely changed a word or recast a sentence; at others he omitted sentences altogether or supplied their places by others of more pleasing structure—and few of our prose writers have had a finer ear for the harmony of a period. In Sir Harris Nicholas's superb edition of the 'Complete Angler' the alterations in the fifth edition are pointed out, and are worthy the examination of those who are curious in such matters. Though the 'Angler' has been his most popular work, his 'Lives' have been admired by all who are capable of admiring good plain earnest writing, even when the sentiments may not always coincide with their own. Wordsworth has a fine sonnet on them, commencing—

> "There are no colours in the fairest sky
> So fair as these:"

and though few could assent to such praise, few will deny their exceeding beauty. We have not perhaps any other biographical sketches so beautiful in their way as these. They abound in depth of feeling as well as in lively and good-natured pleasantry. Who can read unmoved, for instance, the old man's touching conclusion to his life of Sanderson:—"It is now too late to wish that my life may be like his, for I am in the eighty-fifth year of my age: but I humbly beseech Almighty God that my death may; and do earnestly beg of every reader to say Amen." As a mere psychological study, the works of a man who began writing at sixty and wrote his last work (a sketch of the character of John Chalkhil* to whose poem of 'Thealma and Clearchus' it was prefixed), at ninety, would be worth reading.

We have dwelt longer on Izaak Walton than we intended, but in treating of his own Lea we could not pass him by with a cursory notice. We shall now quit him, giving just one sample of his conversation as he sat under a honey-suckle hedge along with his scholar, and talked to him of the pleasures he had there partaken of.

"Look, under that broad beech-tree I sat down when I was last this way a-fishing, and the birds in the adjoining grove seemed to have a friendly contention with an echo, whose dead voice seemed to live in a hollow tree, near to the brow of that primrose hill: there I sat viewing the silver streams glide silently towards their centre, the tempestuous sea; yet sometimes opposed by rugged roots and pebble-stones, which broke their waves and turned them into foam: and sometimes I beguiled time by viewing the harmless lambs, some leaping securely in the cool shade, whilst others sported themselves in the cheerful sun: and saw others craving comfort from the swollen udders of their bleating dams. As I thus sat, these and other sights had so fully possessed my soul with content, that I thought, as the poet has happily expressed it—

> 'I was for that time lifted above earth,
> And possessed joys not promised in my birth.'"

The rambler, who wishes to obtain some notion of the Lea as it was in the days of honest Izaak should follow the old course of the river throughout. The new cuts made for the convenience of traffic are as straight and still as those of a Dutch canal: while the old river, neglected by all but the angler, is as pliant and various in outline as any other of Nature's own works. A prettier river of its kind it would not be easy to name than is the Lea for the next few miles of its course. Its banks are suffered to yield to the influence of the stream and are as unconstrained as its waves. Here decked with a profusion of primroses and cowslips, or the graceful wind-flower—there sloping gently down, with only a few 'wee pink-tipped daisies' to relieve the bright green sweep—presently covered with a tangled heap of brambles and other lowly shrubs, or as a great authority in the picturesque might say,* "with thorns and briars and other ditch trumpery";—while in early spring the blackthorn, or, somewhat later, the wild rose bush with perhaps a honeysuckle clinging about it (a marriage of exquisite grace and sweetness)—shed beauty and fragrance around. The river too is brilliant with aquatic plants, which, from the flowering rush to the yellow water-lily are in great luxuriance. Spring is peculiarly the time to enjoy the Lea. Walton makes his anglers ramble beside it on May-day and he chose his time well: its placid character is in unison with the gentle season. The lack of foliage along its borders,—for there is seldom any other tree than an old pollard willow, or a few alders,—of some consequence as regards the picturesque, but of little value for shade, prevents a full enjoyment of it in summer, and renders it less attractive than more wooded streams, in autumn: but it is just the place in which the angler or lover of nature may best enjoy

> "Sweet spring, full of sweet days and roses."

Singer, in his reprint of 'Thealma and Clearchus,' maintains that Chalkhil is a mere pseudonym, and that the poem is Walton's own. This opinion is adopted in Major's edition of the 'Complete Angler,' and enforced at some length in an article on Chalkhil in the Retrospective Rev.' v. iv.' but Archdeacon Nares in the 'Gentleman's Mag.' and Sir H. Nicholas in his 'Notes to Walton' have sufficiently established the reality of Chalkhil's existence, and shown that Walton, by having married into his family, might easily have obtained the MS. To us, the internal evidence alone is sufficient to determine that Thealma was not written by Walton; and in so saying, we have not forgotten the reviewer's supposition, that it might have been a juvenile production.

* Gilpin, *Forest Scenery*.



[Broxbourne Church.]

RAMBLES FROM RAILWAYS.

The Lea.—No. V.

We have gossipped so much along the first few miles that we must hasten over the remainder of our journey. We need not turn aside to Haylesbury, where is the well known College of the East India Company, in which Mackintosh and Malthus have dispensed of their learning and wisdom. Nor will we stop at St. Margaret's longer than to call attention to it as offering many choice bits of river scenery. In Stansted parish, at a short distance from the river on the Newmarket road, the rambler will see an old brick building rapidly going to decay: it is the Rye-house, the scene of the famous Rye-house plot, which led to the trial and execution of Lord William Russel and Algernon Sidney. The object of the plot was to waylay and assassinate Charles II. and his brother James on their return from Newmarket. The Rye-house was then in the occupation of Rumbold, one of the conspirators, and was fixed upon as their rendezvous, and as the most convenient place to intercept the king; but the scheme failed owing to the royal party returning sooner than the anticipated period. The project was revealed by Keeling, one of the party concerned, who said that Lord Russel was acquainted with it, and pledged to aid in the assassination of the king. We need not go on with so well known a tale. As Hallam in his 'Constitutional History of England,' observes, "there appears no cause for doubting the reality of what is called the Rye-house plot while it is needless to add that the main plot for assassinating the King and the Duke of York had no immediate connection with the schemes of Russel, Essex, and Sidney." Only a portion of the house remains, and that is rapidly crumbling away; but it will repay a close inspection. It is of brick, and about the outside there is some rather superior carving, though a good deal defaced. The principal chimney too is a very fine one. At one of the angles of the building is a turret, but the upper part has fallen in. It has been for many years used as a workhouse for Stansted parish; at present it is rented by the landlord of the New Rye-house, a little public-house just by. The interior bears all the marks of the purpose to which it has been applied. Not a vestige of ornament of any kind remains. The large old fire-places have made way for the most miserable of modern ones. Every part is covered with layers of whitewash, the accumulations of monthly applications repeated for years. The only thing of any kind in the interior of the house that will attract a second look is the winding brick staircase up the turret mentioned above, and that has somehow escaped the brush. We think it right to mention all this, because the elaborate finish of the exterior may lead the visitor to expect something in the inside very different to the poverty-stricken aspect it presents. The foundations of the house appear to be every where sapped, and the whole must soon fall.

Our river now passes a little to the east of Hoddesdon, which, if we visit it, need not detain us long. Here was the 'Thacht-house,' where Venator proposed to "drink his morning's draught;" a cottage at the northern extremity of the town is pointed out as the original, but it is doubtful if it be so. Mat. Prior in his ballad of Down Hall mentions the Bull Inn as the place where he stopt on his way to take possession of his residence of that name.

> "Into an old inn did their equipage roll
> At a town they call Hodsdon, the sign of the Bull,
> Near a nymph with an urn that divides the highway,
> And into a puddle throws mother of tea:"

he does not however praise the fare, and he says of the hostess,—

> "She roasted red veal, and she powdered red beef;
> Full well she knew how to cook up a fine dish,
> For tough were her pullets and tender her fish.
> Down, down, derry down."

But as the nymph with an urn is gone, and the inn is rebuilt, we may reasonably hope that a better purveyor now rules the roast. Hoddesdon presents not a single noticeable feature; it is one of the barrenest places of its size we know. At the London end of it, there is, indeed, a rather fine mansion (now undergoing renovation) of the Elizabethan period, called Champion-house, a seat of the Dymock family, whose chief is the *Champion* of our royal coronations.

At Stanstead the Lea is joined by the Stort, which here loses its name. The river hereabouts is a very favourite resort of the London angler, and a moderate degree of skill usually suffices to ensure a few bites,

though the Lea fisherman is apt to boast that it requires a cunning hand to obtain much success. It will be confessed that here a man may enjoy that union of contemplation and action, which, according to our master, "does most properly belong to the most honest, ingenuous, quiet, and harmless art of angling;" while should rain change to threaten he may, like Izaak and his scholar, "turn out of the way a little, towards yonder high honeysuckle hedge; and there sit and sing whilst the shower falls so gently upon the teeming earth, and gives yet a sweeter smell to the lovely flowers that adorn these fragrant meadows."

But we must not linger. At Broxbourne, the next place we arrive at, there is a church that we will quit our river for awhile to examine. It is of large size, and of much beauty. It belongs to the time of Henry II., and consists of a nave, chancel, and aisles; at the west end there is a tower with a plain spire, and beacon turret; and a small chapel is attached to each angle of the church. That on the north side was built in the reign of Henry VIII. by Sir William Say, Knight, as appears by the inscription on the frieze surrounding the outside, and which is intersected with shields of arms. In the interior is an altar tomb of grey marble of elaborate workmanship; it is placed beneath the arch which separates it from the chancel, and is inscribed to the memory of the above Sir Wm. Say, who died in 1529, and to his "wyffs, Genevese and Elizabyth." There are several other monuments to the Say family; and many curious ones to other persons. A great number of brasses still remain, and several have been covered by the pews. Many of the monuments deserve regard as illustrative of the costumes of the period of the Tudors, as well as being curious in themselves; and altogether the church is of a more than commonly interesting character.

Broxbourne is a pretty place, and the Lea is carefully 'preserved' throughout it. Want's Inn at Broxbourne is much frequented by London anglers, and there is goodly display in it of fish stuffed on account of their superior size. Here, as at Rye-house, the London citizen may enjoy the luxury of 'chops to follow,' as well as in a city chop-house. At Wormley, a little further on, is a neat little church, consisting of only a nave and chancel. It is an old building; on the north side there is a small Norman doorway, and in the interior are several curious and very ancient brasses.

Adjoining Wormley is Cheshunt, a long village of respectable, though not particularly attractive appearance. Cheshunt has been stated to be the Durolitum of Antoninus, and the fact of a number of Roman coins, &c. having been found here, strengthens the supposition. Others, however, who have paid attention to the subject, believe Durolitum to have been at Low Layton on the other side of the Lea, and six or seven miles nearer London; while Professor Key, in the Map of Ancient Britain published by the Society for the Diffusion of Useful Knowledge, places it by Romford in Essex, ten or twelve miles from either of these places; and Talbot has fixed on Brentwood as the site: at each Roman remains have been discovered. Wolsey once dwelt in Cheshunt; the manor of St. Andrew-le-Mote having been granted to him by Henry VIII., who gave it, after Wolsey's fall, to the Earl of Worcester, and afterwards to Thomas Denny: for Henry appears to have reclaimed his gifts with as much nonchalance as he presented them. It has since passed through many hands, and was recently the property of the late Sir J. Shaw, Chamberlain of the City of London. The house is a plain brick structure, but retains little of its original character, having been frequently altered and modernized. At Cheshunt was Theobald's, the residence of the celebrated Lord Burleigh; and here Queen Elizabeth often visited her favourite minister. Not a fragment of the mansion now remains. The name alone is preserved by some houses erected on its site. Here, too, dwelt Richard Cromwell, after his return to England in 1680, in a house close by the church. He assumed the name of Clarke, and spent the remainder of his life in a round of conviviality. He was of an easy, good natured, social turn, utterly without decision or even strength of character, and with a mind quite incapable of ambition. There are many anecdotes of his orgies while at Cheshunt, but none worth repeating. A greater statesman than Richard Cromwell—and, though not so famous, an honester than either Wolsey or Burleigh—Lord Somers, also resided at Cheshunt. And here, when excluded from any share in the government by the state of parties during the earlier years of the reign of Anne, he lived in retirement, spending his time in antiquarian and other literary pursuits, and in scientific investigation; he was, as Burnet tells us, very learned, and had formed a large collection of medals and valuable books and prints. It is pleasant to figure to oneself the noble-minded statesman thus enjoying his leisure—the true *otium cum dignitate*. On the Lea, at the northern end of Cheshunt, are some remains of a nunnery, which have been converted into a dwelling; they are not very remarkable in their appearance. Cheshunt also contains a college, established by the celebrated Countess of Huntingdon, for the training of young men for the ministry, principally in connection with the sect named after her.

A little way past Cheshunt, on the road to London, is Waltham Cross, a small hamlet that takes its name from a cross of singularly fine workmanship, erected by Edward I. to the memory of his consort Eleanor. It is of great beauty, and should not be passed by without regard. A few years back it was restored with much judgment and taste. A full description of it, with engravings, as restored, was given in No. 113 of the 'Penny Magazine;' we need not therefore dwell longer upon it now.

Near Waltham the Lea is divided into several streams which are thought by many to be the channels that Alfred formed when he diverted the waters of the Lea, and thus left the Danish fleet aground in the meadows between Waltham and Ware. Speman, however, in his 'Life of Ælfred the Great,' endeavours to show that the trenches that now branch from the river between Temple Mills and Old Ford, and join it again by Bromley, were those he cut for that purpose. Be that as it may, the Lea here separates into a number of small streams. Several of them run through Waltham Holy Cross, a large irregular town, about a mile and a half east of the Cross above spoken of. Waltham owes its name of Holy Cross to a cross with a figure of the Saviour upon it, said to have been discovered in a vision to a carpenter at Montacute, and brought here in an unknown manner. "Tovi, a man of great wealth and authority, *stalhere*, or standard-bearer to King Cnute," built a church for the reception of this cross, and many marvellous cures were effected by its means. Edward the Confessor afterwards became possessed of Waltham, and built and endowed a monastery there. The abbey church was erected by Harold, whose body, after his death at the battle of Hastings, was brought here for interment. The abbey has undergone some strange changes, but this is not the place for tracing its history, which indeed would take up no little space to tell at all properly. Of the abbey only a small portion now exists—that used as the present parish-church, and a gateway by the Lea, of which we give a sketch (*Fig* 7). It stands a short distance from the Abbey Mills, and is built of stone, but repaired with bricks of a large size. The corbels on which the outer mouldings of the large arch rest, are formed by "demi-angels sup-

porting shields, on which are the royal arms of Edward the Third's time, viz. France and England quarterly." These, however, are so much defaced as to be made out with difficulty. The abbey buildings are said to have originally covered several acres.

It would take up too much of our time to attempt to describe the church, and there are so many descriptions of it extant that it is needless. There are few churches anywhere that will more amply repay examination, both as regards the interior and exterior. It is perhaps the earliest and most curious example of Anglo-Norman architecture now remaining in England. There are a great many windows, doorways, and arches that deserve attention, and inside are several massive columns curiously carved. There is too a remarkably fine crypt. The interior also contains several interesting monuments. As we mentioned above, the body of Harold was interred here, and a tomb with the inscription "*Hic jacet Harold Infelix*" long remained in memory of him. It was opened in the reign of Elizabeth, and the skeleton of a man found inside. Some notion of the original size of the church may be formed when we find it stated that "Harold's tomb was situated about forty yards from the present termination of the building, in the eastern part of the original choir." A full History of Waltham Abbey (though not perhaps an entirely trustworthy one) is appended by Fuller to his 'Church History.' * Fuller was curate of Waltham, and repeats with much delight some of the merry tales he had collected about the monks of Waltham—who seem indeed to have been pretty much like those of Melrose the ballad speak of. Henry VIII. had a pleasure-house in the fields near Waltham, and there is an uncommon number of right pleasant stories told of him there, but we have so outrun our space we must not repeat any of them. Along the various branches of the Lea about Waltham are scattered extensive gunpowder works belonging to the government: but it must be confessed they add very little to the beauty of the neighbourhood.

On our left the high grounds stretching to Epping Forest offer us some tempting walks: and many a pleasant stroll may be found over those hills and among the woods beyond. Epping Forest is not what it was—so many of the larger trees have been cut down as greatly to interfere with its character as a forest: yet there are not a few quiet secluded spots such as a Londoner would glory to meet with. But is not Epping Forest classic ground with every genuine cockney? Where is its Fairlop fair? Or shall its Easter hunt ever be forgotten? Alas! all that is earthly fades away. The fair is obsolescent; and of even the Epping hunt the glory is departing. In a few years Cruikshank's cuts will alone remain to tell of the assembled host of cockney equestrians and city belles—of the daring feats of horsemanship, and the strange adventures of that day—"so renowned, so glorious."



[Abbey Gates, Waltham.]

On the other side of our river we soon reach Enfield Wash; and shortly after Edmonton, to whose churchyard we must turn aside, for here, "in a spot which, about a fortnight before his death, he had pointed out to his sister, on an afternoon wintry walk, as the place where he wished to be buried," * lie the remains of Charles Lamb, the *Elia* who has thrown so many pleasant memories over so many every-day circumstances and objects. On a plain upright stone is the following inscription by his friend Dr. Carey, the translator of Dante:—

"To the Memory of Charles Lamb,
Died December 27, 1834, aged 59.

"Farewell, dear Friend! that smile, that harmless mirth
No more shall gladden our domestic hearth;
That rising tear, with pain forbid to flow,
Better than words no more assuage our woe;
That hand, outstretched from small but well-earned store,
Yield succour to the destitute no more,
Yet art thou not all lost; through many an age,
With sterling sense and humour shall thy page
Win many an English bosom, pleased to see
That old and happier vein revived in thee.
This for our earth: and if with friends we share
Our joys in heaven, we hope to meet thee there." †

Charles Lamb lived for many years in this neighbourhood, first at Enfield, and then, till the close of his life, at Edmonton. His last days were not his happiest. He hated the country, and even Edmonton was not enough like London to satisfy him. He had spent his whole life laboriously, and though he had been for years longing for leisure, he found it a weariness when it came. His letters, written after he had retired from his office, are filled with complaints, in his half-mocking manner indeed, but evidently too real, of the misery of having too much time. He was a man of kindly affections, beloved to an uncommon degree by all who knew him; and in literature we shall in vain look for his successor in that rich, racy, quick-ish, half jesting, half-serious style, so peculiarly his own.

* Farmer also wrote a 'History of Waltham Abbey,' and the reader will find much additional information in Morant's 'Essex,' and in Brayley; we ought not in gallantry to omit the name of Mrs. Elizabeth Ogborne, who, in her 'History of Essex,' gossips famously about Waltham. Its architectural features are examined at considerable length in Britton's 'Architectural Antiquities.'

† We heard a piece of criticism on this inscription that Lamb would have enjoyed. As we were copying it, a couple of canal excavators came across the churchyard, and read it over with great deliberation, when they had finished, one of them said, "A very fair bit of poetry that;" "Yes," replied his companion, "I'm blest if it isn't as good a bit as any in the churchyard—rather too long though."

Punch in Paris.—Punch is, if possible, more popular here than in London. It is quite extraordinary the number of people who assemble to witness his vagaries. Places are taken as if to see a grand performance, and most respectable persons watch the movements of the actor with the greatest interest.—*Impressions and Observations of a Young Person resident in Paris.*



[The figures from the Monument of Lorenzo de' Medici at Florence.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXVI.

MICHAEL ANGELO: b. 1474; d. 1564.

WE have spoken of Lionardo da Vinci. Michael Angelo, the other great luminary of art, was twenty-two years younger: but the more severe and reflective cast of his mind rendered their difference of age far less in effect than in reality. It is usual to compare Michael Angelo, with Raphael, but he is more aptly compared with Lionardo da Vinci. All the great artists of that time, even Raphael himself, were influenced more or less by these two extraordinary men, but they exercised no influence on each other. They started from opposite points; they pursued throughout their whole existence, and in all they planned and achieved, a course as different as their respective characters. It would be very curious and interesting to carry out the comparison in detail: to show the contrast in organization, in temper, in talent, in taste, which existed between men so highly and so equally endowed, but our limits forbid [illegible] indulgence. We shall therefore only observe [illegible] that considered as artists they emulated each other in variety of power, but that Lionardo was more the painter than the sculptor and architect; Michael was more the sculptor and architect than the painter. Both sought true inspiration in nature, but they beheld her with different eyes: Lionardo, who designed admirably, appears to have seen no *outline* in objects, and laboured all his life to convey by colour and lights and shade the impression of beauty and the illusive effect of rotundity. He preferred the use of oil to fresco, because the mellow smoothness and transparency of the vehicle was more capable of giving the effects he desired. Michael Angelo, on the contrary, turned his whole attention to the definition of form, and the expression of life and power through action and movement; he regarded the illusive effects of painting as meretricious and beneath his notice, and despised oil-painting as a style for women and children. Considered as men, both were as high-minded and generous as they were gifted and original, but the former was as remarkable for his versatile and social accomplishments, his love of pleasure and habits of expense, as the latter for his stern inflexible temper, and his temperate, frugal, and secluded habits.

Michael Angelo Buonaroti was born at Sottignano, near Florence, in the year 1474. He was descended from a family once noble—even amongst the noblest of the feudal lords of northern Italy—the Counts of Canossa; but that branch of it represented by his father, Luigi Lionardo Buonaroti Simoni, had for some generations become poorer and poorer, until the last descendant was thankful to accept an office in the law, and had been nominated magistrate or mayor (*Podestà*) of Chiusi. In this situation he had limited his ambition to the prospect of seeing his eldest son a notary or advocate in his native city. The young Michael Angelo showed the utmost distaste for the studies allotted to him, and was continually escaping from his home and from his desk to haunt the ateliers of the painters, particularly that of Ghirlandajo, who was then at the height of his reputation, and of whom some account has been already given.

The father of Michael Angelo, who found his family increase too rapidly for his means, had destined some

of his sons for commerce (it will be recollected that in Genoa and Florence the most powerful nobles were merchants or manufacturers); and others for civil or diplomatic employments. But the fine arts, as being at that time productive of little honour or emolument, he held in no esteem, and treated these tastes of his eldest son sometimes with contempt and sometimes even with harshness. Michael Angelo, however, had formed some friendships among the young painters, and particularly with Francesco Granacci, one of the best pupils of Ghirlandajo; he contrived to borrow models and drawings, and studied them in secret with such persevering assiduity and consequent improvement that Ghirlandajo, captivated by his genius, undertook to plead his cause to his father, and at length prevailed over the old man's family pride and prejudices. At the age of fourteen Michael Angelo was received into the studio of Ghirlandajo as a regular pupil, and bound to him for three years; and such was the precocious talent of the boy, that instead of being paid for his instruction, Ghirlandajo undertook to pay the father, Lionardo Buonaroti, for the first, second, and third years, six, eight, and twelve golden florins, as payment of the advantage he expected to derive from the labour of the son. Thus was the vocation of the young artist decided for life.

At that time Lorenzo the Magnificent reigned over Florence. He had formed in his palace and gardens a collection of antique marbles, busts, statues, fragments, which he had converted into an academy for the use of the young artists, placing at the head of it a director a sculptor of some eminence named Bertoldo. Michael Angelo was one of the first, who, through the recommendation of Ghirlandajo, was received into this new academy, afterwards so famous and so memorable in the history of art. The young then not quite sixteen, had hitherto occupied himself chiefly in drawing; but now, fired by the beauties he beheld around him, and by the example and success of a fellow pupil, Torregiano, he set himself to model in clay, and at length to copy in marble what was before him; but, as was natural in a character and genius so steeped in individuality, his copies became not so much imitations of form as original embodiments of the leading idea, and Lorenzo de' Medici, struck by his extraordinary power, sent for his father and offered to attach the boy to his own particular service, and to undertake the entire care of his education. The father consented, on condition of receiving for himself an office under the government, and thenceforth Michael Angelo was lodged in the palace of the Medici and treated by Lorenzo as his son.

Such sudden and increasing favour excited the envy and jealousy of his companions, particularly that of Torregiano, who being of a violent and arrogant temper, while that of Michael Angelo was by no means conciliating, sought every means of showing his hatred. On one occasion a quarrel having ensued while they were at work together, Torregiano turned in fury and struck his rival a blow with his fist which disfigured him for life. His nose was flattened to his face, and Torregiano, having by this "sacrilegious stroke," gratified his hatred, was banished from Florence.

It is fair, however, to give Torregiano's own account of this incident as he related it to Benvenuto Cellini, many years afterwards. "This Buonaroti and I, when we were young men, went to study in the church of the Carmelites, in the chapel of Masaccio; it was customary with Buonaroti, to rally those who were learning to draw there. One day, among others, a sarcasm of his having stung me to the quick, I was extremely irritated, and doubling my fist gave him such a violent blow on the nose that I felt the bone and cartilage yield as if they had been made of paste, and the mark I then gave him he will carry to his grave."

Thus it appears that the blow was not unprovoked, and that Michael Angelo, even at the age of sixteen, indulged in that contemptuous arrogance and sarcastic speech which, in his mature age, made him so many enemies;—but to return.

Michael Angelo continued his studies under the auspices of Lorenzo: but just as he had reached his 18th year he lost his generous patron, his second father, and was thenceforth thrown on his own resources. It is true that the son of Lorenzo, Piero de' Medici, continued to extend his favour to the young artist, but with so little comprehension of his genius and character, that on one occasion he set him to execute a statue of snow for the amusement of his guests.

Michael Angelo, while he yielded, per force, to the caprices of his protector, turned the energies of his mind to a new study—that of anatomy—and pursued it with all that fervour which belonged to his character. His attention was at the same time directed to literature, by the counsels and conversations of a very celebrated scholar and poet, then residing in the court of Lorenzo, Angelo Politziano, and he pursued at the same time the cultivation of his mind, and the practice of his art. Engrossed by his own studies, he was scarcely aware of what was passing around him, nor of the popular intrigues which were preparing the ruin of the Medici; suddenly this powerful family were flung from sovereignty to temporary disgrace and exile; and Michael Angelo, as one of their retainers, was obliged to fly from Florence, and took refuge in the city of Bologna. During the year he spent there he found a friend, who employed him on some works of sculpture: and, on his return to Florence, he executed a Cupid, in marble, of such beauty, that it found its way into the cabinet of the Duchess of Mantua, as a real antique. On the discovery that the author of this beautiful statue was a young man of two-and-twenty, the Cardinal San Giorgio invited him to Rome, and for some time lodged him in his palace. Here Michael Angelo, surrounded and inspired by the grand remains of antiquity, pursued his studies with unceasing energy: he produced a statue of Bacchus, which added to his reputation; and the group of the dead Christ on the knees of his Virgin Mother (called *the Pietà*), which is now in the church of St. Peter's at Rome:* this last, being frequently copied and imitated, obtained him so much applause and reputation, that he was recalled to Florence, to undertake several public works, and found himself once more established in his native city about the year 1501.

CASTS FROM MEDALS AND MEDALLIONS.

There have been many different modes practised of taking casts from medals, coins, and other small articles having a device in relief. The recent progress of electro-metallurgy seems to afford ground for thinking that casts in copper or other metal, through the medium of moulds made also of metal, will become the

* This 'Pietà' is the only work whereon Michael Angelo inscribed his name, which he has carved distinctly on the girdle of the Virgin. The circumstance which induced him to do this is curious. Some time after the group was fixed in its place, he was standing before it considering its effect, when two strangers entered the church, and began, even in his hearing, to dispute concerning the author of the work, which they agreed in exalting to the skies as a masterpiece. One of them, who was a Bolognese, insisted that it was by a sculptor of Bologna, whom he named. Michael Angelo listened in silence, and the next night, when all slept, he entered the church, and by the light of a lantern engraved his name, in deep indelible characters, where it might best be seen.

most easily executed of all, and more durable than most others. The principal methods employed may be here briefly described.

The moulds are made of sulphur, of plaster of Paris, of wax, or of horn. The first of these is in very general use, from the ease with which the mould is made; but it is defective for fine specimens, from two or three circumstances: the sulphur is liable to injure a medal, and the fine lines of the device are seldom brought out clearly and sharply in the mould. The medal or coin is generally oiled before the mould is made from it; and as this oil is liable to flow down in little pools to the cavities of the medal, this is in itself sufficient to injure the sharpness of the mould taken from it; and there is also a liability of the melted sulphur becoming cold before it reaches these depressed parts. To avoid the inconvenience resulting from the use of oil, it has been recommended to use some kind of oily composition that shall not flow into the cavities too fully.

That sulphur moulds can, however, be taken from medals or small objects with great delicacy, in the hands of a clever artist, was shown some few years ago by Mr. Francillon, an eminent jeweller. He possessed an invaluable rosary, formed of nectarine stones, and engraved by the celebrated Florentine artist Benvenuto Cellini. Each of these stones had either the head of a Roman emperor or of a pope, most exquisitely carved on one side of it; while on the other side was a carved representation of a triumphal arch, a public building, or some other object. From these small but precious specimens Mr. Francillon was accustomed to take casts in plaster, through the medium of sulphur-moulds. His mode of procedure was as follows:—He first encircled each head or model with a border formed of paper or pasteboard, and rising to a greater height than the most prominent part of the model. A small quantity of sulphur was then melted in a suitable vessel, and brought to that condition where it assumes a thick consistency and a brown colour: then, allowing it to cool down to the limpid state of a liquid (which is one of the peculiarities of this substance), it was poured into the cell containing the model, the latter having been previously oiled to prevent adhesion. When cold the sulphur was removed from the pasteboard border, the model was taken out of it, and it then formed a mould of the object. From this mould casts were taken in plaster of Paris. It was moistened with a mixture of oil and rum, and was encompassed by a pasteboard border, as the model had before been. A mixture was then made of fine new plaster of Paris and raw terra sienna, brought to a liquid state by thin gum-water; and this being poured gently into the mould, it was blown strongly upon, in order to make it fill the hollows and drive out all the air-bubbles. When the plaster had become hard, the rim of cardboard was removed, and replaced by another of greater thickness, which formed a permanent strengthening rim for the plaster cast. In this way all the beads of the rosary were imitated.

Plaster casts of medals are sometimes taken from plaster moulds. In this case the mould requires to be very plentifully oiled, in order to yield a clear and fine cast; and even when quite saturated with oil, it does not always prevent adhesion between the mould and the cast. The following has been recommended as one mode of preventing this adhesion, viz. to dip the plaster mould into melted wax, and allow it to remain till the wax has well penetrated into the plaster; then, when about to be used, the surface of the mould is to be moistened with wax dissolved in spirit of turpentine; and after a lapse of a quarter of an hour, the mould will be ready for the reception of the plaster.

A mould of wax is for many purposes deemed preferable to one of sulphur or of plaster, but requires much care and attention in the preparation. A ledge or border is formed round the medal, as before, either of paper, pasteboard, or lead from a tea-chest. This is bound round close to the edge of the medal, and made to project half an inch or so above it. The wax is put into a cup, and the cup immersed in boiling water, so that the wax becomes melted through the medium of the cup, which cannot be raised to a higher heat than that of boiling water. The wax being melted, and the medal slightly warmed and oiled, the wax is poured quickly into the cell surrounding the medal. When cold the edge or border is stripped off; and if the medal can be removed easily from the mould thus formed, it is so; but if not, it is slightly warmed on a heated plate, by which the two are made easily separable. To cast from this mould, it is only requisite to surround it with a border, and to pour in liquid plaster in the same way as was before noticed; but if there are many deep cavities in the mould, the plaster is worked into them by the aid of a camel-hair pencil.

A method was some years ago practised in France, whereby moulds or reverse copies of medals were made in horn. A piece of horn, such as is used by comb-makers, was worked out even and flat, and polished on one side. It was cut square a little larger than the medal and was then ready to be acted on by heat. Two thick flat plates of iron, rather large; than the piece of horn, were heated to a degree which would soften without burning the horn. One of these was laid upon the bed of a press; two or three pieces of thick moistened pasteboard were laid upon it; the medal was placed upon the pasteboard, having that side uppermost which was to be copied, and which was oiled for that purpose; the piece of horn was laid, polished side downwards, upon the medal; and at the top of all was placed the other heated plate of iron. The press was then worked gradually, first to bring the various pieces into close contact, then to press them on one another with a slight force: and then, as the horn became softened by the heated iron plates, to make the pressure powerful. By this softening and pressure, the substance of the horn was driven into all the minute devices of the medal; and in order to retain the effect thus produced, the pressure was continued for twenty-four or thirty hours. When the plates and the horn had been thus allowed to cool gradually, and to remain under pressure so long, the horn was found to assume the form of a hollow mould of the medal, sharp and well defined; specimens have been described, in which the hair and other extremely minute details of a medal have thus been copied in horn with the utmost exactness and delicacy. From a horn mould, thus made, casts could be taken in plaster.

Impressions of medals are occasionally taken in glue. To effect this, a little isinglass glue is melted with brandy, and poured thinly over the medal, so as to cover its whole surface. This is allowed to remain for a day or two, by which time it becomes thoroughly dry and hardened; and when taken from the medal, the film of glue presents a fine, clear, thin, and hard copy of the medal, somewhat similar in appearance to a piece of talc. A copy from the medal, made in this way, is not calculated to serve as a mould from which further impressions may be taken, but forms in itself the duplicate of the medal. Glue moulds are, however, occasionally made, formed of the common glue, and poured on the medal in the same manner as sulphur or plaster would be, so as to lie on the medal in a considerable body; this method is serviceable when the object to be copied is much under-cut, and therefore requires considerable elasticity in the substance of the mould in order that the object may be removed from it.

Casts from moulds are made occasionally of bread. For this purpose a piece is taken from the "crumb" or inner part of a new loaf, and thoroughly kneaded in the hand, till it acquires a consistency soft enough to take an impression, but not so soft as to adhere to the medal. In this state it is pressed carefully on the medal so as to come in contact with it in every part; and afterwards the bread is cut into any convenient form. Some years ago a fashion was in vogue for making bread seals by these means; but the mode is a very imperfect one.

By far the most valuable and important method of copying a medal is that which has recently arisen from the astonishing discoveries in electro-metallurgy. Here no press is required, nor a crucible or furnace, and yet the most beautiful copies of medals may be procured in gold, silver, copper, and several other metals. The scientific principles on which the method rests are too complicated to be dwelt on fully here, but a few explanations may suffice.

When chemical bodies are brought to act on each other under certain conditions, a galvanic current is occasioned, which, nine years ago, was regarded only as a scientific phenomenon, but has now become available as a motive power for telegraphs, clocks, carriages, and other contrivances. Thus, if a piece of copper and a piece of zinc be dipped into weak acid, and connected by a piece of dry wire, the difference of action of the acid on the two metals gives rise to a current of electricity. From this germ successive stages of improvement have resulted, one of which consists in making the current deposit a thin layer of metal in the course of its circuit, and thus has arisen the new art of electro-metallurgy.

One form of the apparatus now employed applicable to the copying of medals, will give a sufficient idea of the general character of the arrangement. A cylindrical vessel is provided, in which is placed a smaller cylindrical vessel, made of porous earthenware. In the outer vessel is placed a solution of a metallic salt: in the inner one is a piece of zinc, immersed in a weak acid solution. The medal or object from which the impression is to be taken, is fastened at one end of a piece of wire, the other end of which is attached to the piece of zinc within the inner vessel. Here is the whole apparatus, for nothing more is necessary to induce the generation of an electrical current, which current causes the deposition on the medal of a thin film of metal from the solution in the outer vessel.

There are two points to be here taken into consideration; viz., the nature of the metallic solution, and the nature of the substance on which the precipitation takes place.

If the metal to be deposited is copper (the most usual in common experiments) the solution employed is that of a sulphate of copper; and the galvanic action, by separating the copper from the sulphuric acid, with which it is combined, deposits the former on the medal or other object contained in the solution. Most of the other metals, in order to be deposited in a similar manner by galvanism, require more delicacy of management than is consistent with familiar experiments; but success has been attained with gold, silver, platinum, rhodium, nickel, iron, tin, lead, antimony, and several other metals.

As to the substance on which the deposit takes place, this may either be the metal itself, or a mould taken from the medal; and this mould may be of wax, or stearine, or plaster of Paris, or of many other substances. But, in the latter case, there must be some kind of metallic surface given to it, or the deposition will not take place. If the cast is to be an exact copy of the medal, there must, of course, be a mould first made: although this mould might itself be made of metal, deposited by the electro process, yet as a valuable medal might be injured in the process, it is generally preferred to make the mould of wax, plaster, or some other material, in the way before described; and then to take a cast from this by the electric agency.

When the mould for copying is prepared, it is coated with a fine and delicate layer of black-lead, and is in that state fitted to be introduced into the apparatus. A film of copper gradually forms on the mould, and this film may be increased to any desired thickness by allowing the action to continue for a sufficient time. On separating the copper from the mould, the former is found to be an exact counterpart of the original medal, having all the lines, projections, and cavities which distinguished the medal. Indeed, it results from the nature of the process, that no other mode of copying can approach so near as this to absolute correctness.

So rapidly has this new and interesting art progressed, that the necessary apparatus is now prepared on a very economical scale, and sold at prices to suit the varying means of the experimenters. At the shops of the philosophical instrument-makers, and at the Polytechnic Institution, small sets of apparatus are sold, accompanied by cheap directions for managing the very pretty process.

ON THE TERMS STANDARD, STERLING, AND CARAT.

It is perhaps generally known, though not universally, that the current coins of the realm are not made of pure gold or silver; since the silver coins contain a little copper, while the gold coins contain a little silver or copper, or both mixed. The maintenance of a given relation between the quantity of the cheap metal and of the costly metal, under the name of the *standard*, is connected with some interesting points in the past history of English coinage.

If coins were made of pure gold or pure silver, they would be too flexible to bear the wear to which they are afterwards subjected; and hence the practice of mixing with them a certain proportion of harder metal, which is called *alloy* or *allay*. In all regular governments there has been a *standard* for coins fixed by law; and this standard is so expressed as to indicate the proportions between the respective metals employed. Thus the legal standard for gold coin in England is expressed by the fraction $\frac{11}{12}$, or more commonly $\frac{22}{24}$. This implies that out of every twenty-four parts by weight of standard gold coin, twenty-two consist of pure gold, and the remaining two of alloy (generally silver and copper mixed). In the customary language of goldsmiths, refiners, and bullion-dealers, standard gold is said to be "twenty-two carats fine," a phrase somewhat unintelligible to other persons, but which is to be understood as follows:—"Fine" may be taken as equivalent to "pure," and implying pure or unadulterated gold; and the "twenty-two" as implying that there are twenty-two parts of pure or "fine" gold in twenty-four parts of the standard. But the term "carat" has a little history of its own, rather curious in its character.

The *carat* (or, as it is sometimes spelled, *carract*, *carrat*, *karrat*, and *karrat*) is both a real weight and an imaginary weight. In the former sense it is the weight used in weighing diamonds, pearls, and precious stones; it is equal to about $\frac{1}{150}$th part of a troy ounce, or to about $3\frac{1}{2}$ troy grains: it is divided into halves, and these halves into quarters or grains; while the grains themselves are so subdivided as to yield the eighth, the sixteenth, and the thirty-second parts of a carat, so important is a minute difference of weight in precious stones. In the other sense of the word *carat*, it expresses the degree of fineness of gold, and is

naked culprit bound at his feet, while an allegorical figure behind holds with one hand the scales of justice and with the other the fasces, the emblem of punishment. The figure of an aged man, holding an eye-glass, by the aid of which he appears to be poring over an ancient manuscript, is substituted for that of the pantaloon, with "spectacles on nose," as the representative of the sixth age. The "last scene of all," that of extreme age and decrepitude, completes the artist's circle of human existence, the helplessness of old age and of infancy being thus brought into juxtaposition.

As the subjects of the composition have no reference to any particular period or nation, the artist has very properly avoided the introduction of costume, except in one or two instances, in which it would perhaps have been better omitted. The warrior, for example, is sufficiently indicated without the helmet, which, as the rest of the body is uncovered, seems to be unnecessary, especially as Fame thus appears to be about to place the wreath on the helmet, instead of the head. The book under the arm of the naked boy looks oddly, and might very well have been omitted, the attitude of attention of one of the boys to the figures drawn by the other clearly enough indicating that they are students.

The artist, we think, would have pleased more if he had been less ambitious to exhibit his skill by the display of the naked form, the disposition of some of the drapery which a sense of propriety has compelled him to introduce being unnatural, and therefore ungraceful. The grouping is well arranged, and the composition as a whole is very creditable to the artist, but is hardly sufficiently marked by originality of character or distinctness and power of expression to place the work in the highest class of art.

THE MOVEMENT OF SHINGLE-BEACHES.

THERE are a few interesting circumstances connected with the *shingles* or pebbly beaches so extensively spread along the south coast of England. Every water-side visitor knows something of these—that they are formed of rounded and water-worn pebbles of various sizes; that they slope very gently towards the sea; that they occur sometimes on a flat coast and sometimes between the cliffs and the sea; and that they are more or less washed by every tide. But it is not so generally known how these shingle-beaches interfere with the ports and harbours on the southern coast. Mr. Palmer communicated a paper to the Philosophical Transactions in 1834, which gives instructive details on this point.

It appears that the whole of the shingle has a general eastward movement along the south coast of England, that is from Cornwall onward towards Kent. The currents and tides which flow in from the Atlantic drive this shingle before them, and heap it up on the shore, where it gets gradually shifted along from west to east. These pebbles consist of fragments which have been broken from off the cliffs, or have been brought down by the rivers, and which have become rounded by the action of the water. The more they are worn, the smaller they become, and hence arise all varieties of size from grains of sand up to large stones. Sometimes the shingle merely lies along the coast, forming the well-known "beach" of our southern watering-places; while in other cases, through the action of particular currents, or the contour of the shore, they become grouped up in enormous masses. Thus, during the reign of Queen Anne, the western end of the channel which separates the Isle of Wight from Hampshire, called the Solent, was crossed for more than two-thirds of its width by a bank of shingle, which extended from Hurst Castle, which is about seventy yards broad by twelve feet high, presenting an inclined plane to the west. This bank consists of a bed of rounded chalk-flints, resting on a submarine clayey base. The flints and pebbles are derived from the waste of the Hordwell cliffs to the westward. In the great storm of November, 1824, this bank was moved bodily forwards for forty yards towards the north-east; and certain piles, which served to mark the boundaries of two manors, were found after the storm on the opposite side of the bar. A still more remarkable accumulation of shingle is the Chisel bank, which connects Portland with the mainland. This consists of a ridge of shingle about seventeen miles in length by a quarter of a mile broad; and the pebbles with which it is formed are chiefly flinty, all loosely thrown together, and rising to the height of from twenty to thirty feet above the ordinary high-water mark. This shingle rests on a ledge of rocks situated at a depth of only a few yards beneath the surface of the sea; and this ledge doubtless formed a barrier against which the shingle has accumulated.

Mr. Palmer points out three kinds of movements to which the shingle is subjected, and which, together or separate, have led to the partial blocking up of many harbours on the southern coast. In the first, the sea heaps up or accumulates the loose pebbles against the shore; in the second, the sea breaks down the accumulations previously made; and in the third, the sea removes or carries forward the pebbles in a horizontal direction. The three may therefore be characterized as accumulation, disruption, and progression.

Supposing the shingle to be lying along the shore, the first movement to which it is subjected is to be driven obliquely forward, rather up the shore and rather eastward. It is believed that the waves effect the greater part of this movement, and not currents. Every breaker is seen to drive before it the loose materials which it meets; these are thrown up on the inclined plane of the shore on which they rest, and in a direction corresponding generally with that of the breaker. Most of the winds on the southern coast are from the south-west, and the waves thus generated throw up the shingle in a north-east direction. In most cases it has been observed, that the finer particles descend the whole distance with the returning breaker, unless accidentally deposited in some interstices; but the larger pebbles return only a part of the distance; and it is further observed that the distance to which each pebble returns bears some relation to its dimensions: this indicates the process of accumulation. In other instances, depending on the wind, it is found that pebbles of every dimension return with the breakers which forced them up the beach, and that these are accompanied also by others which had been previously deposited, but which are in some cases disturbed by the waves; and by a continued repetition of the breakers acting in this manner, the whole of the shingle previously accumulated is immersed below the surface of the water: this indicates the process of disruption.

Mr. Palmer thus explains how it is that the larger pebbles are driven higher up the beach than the smaller. We may consider the beach to be an inclined plane, with the waves flowing towards it in an angular direction, say from the south-west. The waves carry with them pebbles of various sizes obliquely up this inclined plane; and when at the summit, each wave breaks partly into spray, which is dispersed in all directions; another part is absorbed; while the remainder flows back again in a shallow form, which rapidly diminishes in its depth; so that the pebbles are soon left exposed, and do not return the whole distance with the water, but are left at rest at a higher level than that from whence their motion commenced. With

the rise of the tide, the striking force becomes similarly elevated; and the pebble is driven farther up the shore in an oblique direction, not falling to so low a depth as that from which it had risen. A pebble of smaller dimensions will be driven upward and onward in the same way, but to a smaller distance; because, from its surface being greater in proportion to its weight, and from its remaining longer immersed in the declining wave, on account of its smaller bulk, it will descend farther with the retreating wave. A pebble of yet smaller size would sink yet farther with the retreating wave; from which it follows that, in a general way, the larger pebbles travel faster onwards and upwards than the smaller. It has been observed by those who attend to the subject, that when this action of the waves has continued equally through a tide, the pebbles are left in tolerably regular order according to their dimensions, the largest being uppermost, and the smallest at the bottom of the beach.

Mr. Palmer has found that the heaps of shingle on a beach are either accumulated or destroyed according to the rapidity with which the waves or breakers succeed each other. When less than eight breakers follow in a minute, the accumulative action which we have just described goes on; but when they are as rapid as ten in a minute, the waves, instead of accumulating more pebbles on the beach, wash away those which had before been accumulated. This curious result is thus explained: that although these rapid waves become dispersed and broken in the same way as the slower ones, yet they follow in such rapid succession, that each wave rides over its predecessor while on its return, and thus produces a continual downward current which carries with it the pebbles that were disturbed. The pebbles are not removed far below the line of low water, and are driven up again when the waves become less rapid. Mr. Palmer observed facts in 1833 which seemed to agree with these views. A rapid succession of waves for five successive tides washed away large heaps of shingle which had accumulated near Folkstone; while the next four tides, less violent in respect to the rapidity of the waves, restored the accumulations. The same thing was observed at Dover and at Sandgate.

Whether the action of the waves is such as to accumulate the shingle upon the beach, or to destroy accumulations previously made, it is found that there is a general motion from west to east along the southern coast of England. Hence there is a liability of harbours being choked up when these shingle-banks approach. To keep off this evil, it has been customary to erect groins jutting out from the shore on the western side of such harbours. These groins are a sort of palisading, formed of piles and wooden planks, or of faggots staked down; they jut out from the shore to the distance of a few yards, and are intended either to break the force of the waves or to retard the progress of the shingle. Many such are to be seen along the coast near Folkstone. The circumstances which regulate the motion of the pebbles have not been very generally attended to; and it was part of Mr. Palmer's object to show that the erection of groins or piers jutting out into the sea could not permanently arrest the progress of the shingle towards the harbours.

If a wall or pier be extended from the shore into the sea, its effect in the first instance is to impede and prevent the progressive movement; and the shingle accumulates up against the pier until the angle formed by the pier and the line of the shore is occupied; and the pier being no longer an impediment to the progressive motion, that motion is again restored, and the general mass proceeds as if no impediment had existed. At the harbour of Folkstone, before the recent proceeding undertaken by the South-eastern Railway Company, this kind of action had been exhibited. Originally the shingle travelled along the line of cliff in the ordinary way; but groins or walls were built out from the face of the cliffs under the hope of driving the shingle out into deep water. The accumulation, however, immediately commenced, and continued until the angle between the barriers and the cliffs was quite choked up; after which the shingle travelled onward as before, and rendered the harbour more and more shallow and useless.

Mr. Palmer thinks that the movement of this shingle, and the consequent injury to the harbours on the southern coast of England, cannot be arrested by any local attempt at one particular spot, but must result from rather an extensive and combined system of operations. "The great objects in view must be attained, first, by securing permanently such accumulations as are necessary for the protection of land from the action of the sea, or useful by their addition to its surface; and, secondly, by facilitating and inciting the progressive motion of that superfluous quantity from whence the evils complained of are derived: and therefore the uninterrupted and permanent welfare of the numerous harbours which communicate with the sea, through the extensive tract of the shingle-beach, is dependent more as a system of management along the coast than upon particular devices adapted exclusively to each separate case."

Mr. Babbage, in his 'Bridgewater Treatise,' notices a remarkable feature observable in shingle-beaches, of ripple marks, or undulations somewhat resembling the ruffled surface of water acted on by a gentle breeze. These, according to his explanation, are a consequence of one fluid flowing over another heavier than itself. He traces the same action in the heavens, and thinks that a "mackerel sky" is an example of ripple, caused by the passage of a current of air above or below a thin stratum of cloud, exciting a friction which raises the surface of the cloud into ripples or undulations. The ripple on the surface of water is occasioned by the friction of air passing over it. When a gentle breeze strikes the surface of the water at a slight inclination, it raises a small wave, which will extend in undulations to a great distance. This first wave, being raised above the general surface, will protect that part of the water immediately beyond it from the full effect of the wind, which will therefore again strike upon the water at a little distance; and, thus, concurring with the undulation, will tend to produce another small wave, and thus again new waves will be produced.

The ripple-marks on sand are similarly explained by considering water to be the lighter fluid, and loose wet sand the heavier fluid; the former flowing over the latter. But in this case the ripple-marks do not disappear when the cause ceases to act, as they do when formed by air on the surface of water: they constitute the marks which we observe when the tide has receded from a flat sandy shore. If, after the formation of ripple-marks at the bottom of a shallow sea, some adjacent river or current deposit upon them the mud which it holds in suspension, then the former marks will be preserved, and new ripple-marks may appear above them. There are sand-hills near Etaples in France, which contain ripple-marks on a large scale: they are crescent-shaped hillocks, many of which are more than a hundred feet high; the height is greatest in the middle of the crescents, declining towards the points; and the slope on the inner side of the crescent, which is remote from the prevailing direction of the winds, is much more rapid than that on which it strikes.



[Bleak Hall.]

RAMBLES FROM RAILWAYS.

THE LEA.—No. VI.

IT was at Edmonton that John Gilpin and his wife should have dined. A painting of John Gilpin's ride is fixed outside a public-house in the town, and the house is commonly known as "Gilpin's Bell;" but we believe it is not the original Bell. It is not, however, without its associations. This is the house to which Charles Lamb used to accompany any of his friends who visited him, on their return; and here he used to take a parting-cup, generally of porter, with them. All who have read Talfourd's 'Life of Lamb' will remember two or three pleasant anecdotes connected with the custom.

About a mile from Edmonton, by the side of the Lea, at a place called Cook's Ferry, stands Bleak Hall, the house to which Piscator took his scholar, and which was then "an honest ale-house where might be found a cleanly room, lavender in the windows, and twenty ballads stuck about the wall; with a hostess both cleanly, and handsome, and civil." The old house is nearly all gone; other building at the right of our engraving being the only portion left, and that, though by no means modern, hardly appears so old as Walton's time. The present public-house stands by the towing-path on a cut of the Lea; and the landlady of it told us that the old Bleak Hall was pulled down several years back, when they built the house they now inhabit. That portion of the old house left standing was a kitchen, with a room over it (ascended by a staircase outside), called the "fishermen's locker," from its having been used as a locker for their tackle. If not the place Izaak Walton refers to, it must long have been a like hostel for Lea fishermen. The evidence appears to tell against its identity, but tradition is strong in its favour.* The road past Bleak Hall leads up to Chingford, a village beautifully situated on the edge of Epping Forest, with one of the prettiest and most rural churches near London. It stands on an elevation, and from its form, and being covered with ivy, imparts quite a rusticity of character to the neighbourhood. There is a very fine view from the churchyard.

Returning to the Middlesex side of the Lea we speedily arrive at the long straggling hamlet of Tottenham, the western extremity of which is called Tottenham High Cross, from a structure that stands on the east side of the high road. According to Lysons ('Environs of London,' iii. 518), Tottenham High Cross is mentioned in the 'Court Roll,' in 1546. It appears to have been originally a wooden cross, covered with lead; this becoming decayed and rotten, was taken down by Dean Wood, about 1600, who erected on its site an octangular brick column, terminating in a pyramid. This still remains, but in 1809 it was repaired by subscription, and covered with stucco and "gothicised." It is at Tottenham that we first make the acquaintance of the characters in the 'Complete Angler,' and the cross is several times spoken of in the course of the work. What a treat it must have been to be greeted by the happy old man with a "welcome to Tottenham High Cross," and with him to "rest ourselves in this sweet shady arbour (alas! there is none such *now* at Tottenham Cross) which Nature herself has woven with her own fine fingers: it is such a contexture of woodbines, sweetbrier, jessamine, and myrtle, and so interwoven, as will secure us both from the sun's violent heat, and from the approaching shower; and being sat down" to partake with him of "a bottle of sack, milk, oranges, and sugar, which all put together make a drink like nectar, indeed, too good for any but us anglers:" and then hear him proclaim his delight in simple rural enjoyment, in such lines as these—

> "Abused * mortals, did you know
> Where joy, hearts-ease, and comforts grow,
> You 'd scorn proud towers,
> And seek them in these bowers;
> Where winds sometimes our woods perhaps may shake,
> But blustering care could never tempest make,
> Nor murmurs e'er come nigh us,
> Saving of fountains that glide by us."

Farewell, Izaak! We here quit thee; last place associated with thy name, and we have spoken of thee so much that we must not more than allude to thee again, lest even thy pleasant name become wearisome. We have known thee long, and talked much of thee; henceforth our acquaintance must be confined to ourselves.

Let us return to our stream; and there is nought on either hand to call us away from it again for some time. The river is here very beautiful, and especially after passing Tottenham Mill, the old course of the

* *i. e.* deceived.

* It is generally called Bleak Hall, and is pointed out and engraved in Sir H. Nicholas's Notes to the 'Complete Angler,' and elsewhere, as the original Bleak Hall of Izaak; but, unless he made a slip of the pen, it cannot be so; for in the conversation on the night spent there (chap. v.), Peter says, "Coridon and I will go up the water towards Ware," "And my scholar and I," replies Piscator, "will go *down* towards Waltham;" whereas this is some miles *below* Waltham. Walton's Bleak Hall was probably somewhere about Broxbourne; most likely not far from Want's Inn. In Major's edition of the 'Complete Angler' the Rye-house is figured as Bleak Hall, but neither as respects situation, nor in any way, does it answer to the description.

Lea affords many a charming little picture. An old pollard willow with an angler under its shadow—a few cows, perhaps, standing in the water, and enjoying with philosophic quiescence the cooling luxury—perchance a punt in the middle of the river—a bright blue sky over head, reflected with a softened lustre in the clear stream—an abundance of yellow water-lilies at our feet—and the low banks decked with all gay flowers—these are the materials of the picture; and he who has not his heart gladdened as he gazes on them has yet to learn that there are things in heaven and earth not dreamt of in his philosophy. Walton was not one of these:

> "The meanest flow'ret of the vale,
> The simplest note that swells the gale,
> The common sun, the air, the skies,
> To him are opening Paradise."

And only such as, in a measure, can participate in these feelings and sympathies are fitted to wander along Izaak Walton's Lea.

Near Lea Bridge, the *Ultima Thule* of incipient cockney fishermen, is the Horse and Groom, the favourite fishing-house of those of maturity in the gentle art. The grounds are picturesque, and the waters well stocked with fish. The fishery along the Lea is carefully preserved, with the exception of two or three intervening spots, from Ware to Temple Mills; and let out for the most part to the persons who rent the several public-houses on its banks. From these the angler obtains permission to ply his cunning, on payment of a yearly subscription; the occasional angler pays by the day. By Lea bridge the East London Water Company have an engine-house, and a canal runs from it, parallel to the towing path of the Lea, to their works at Old Ford, a distance of about three miles. A little on our right is Low Layton, by some supposed (as we mentioned before) to be the Roman Durolitum, from which its name has been thought to be corrupted: but its name is plainly derived from that of the river. In the church is a monument to John Strype the antiquary, who died at the ripe old age of ninety-four; having been curate or minister of Layton ("without institution or induction," as Morant is careful to tell us) above sixty-eight years. He was an unwearying writer, having published thirteen folio and several octavo volumes on antiquities, besides others on divinity. John Bowyer the celebrated printer was also buried here.

Following our river in its windings along the meadows, we pass the White-house fishery and soon reach Temple Mills, between which and Bromley are the channels spoken of above as being, in the opinion of Spelman, Hawkins, and others, those made by Alfred when he altered the course of the Lea. They have all the appearance of being artificial, and so have those about Waltham; is there any reason why both should not have been formed by him?

A mile or two further brings us to Old Ford, so called from the ancient road into Essex having here crossed the Lea. The works and basins of the East London Water Company are situated here and cover an enormous extent of ground. On the road by the water-works there is a tea-gardens, called Clare Hall, that was formerly much frequented by London tradesmen; a machine with painted figures being provided for their amusement, which was described by its contriver as a mill for grinding old people young. But we suppose the march of intellect has lowered the reputation of this miller. Not long after passing the water-works we come to Bow Bridge, a neat granite structure, erected within the last seven or eight years, in the place of an extremely old bridge, of the origin of which we have the following account in Lysons:—"At an inquiry taken before Robert de Retford and Henry Spigurnell, the king's justices in the year 1303, 'the jurors decided upon their oath, that at the time when Matilda,* the good queen of England, lived, the road from London to Essex was by a place called the Old Ford, where there was no bridge, and during great inundations, was so extremely dangerous, that many passengers lost their lives; which coming to the good queen's ears, she caused the road to be turned where it now is, namely, between the towns of Stratford and Westham; and of her bounty caused the bridges and road to be made.'" The bridge afterwards fell into ruins and remained in a dangerous state, "till Queen Elinor of her bounty ordered it to be repaired, committing the charge of it to William de Capella, keeper of her chapel." Bow Bridge was much raised in the centre, so much that the name of the place, Stratford-le-Bow, is said to have arisen from its form. It was a curious old bridge, more curious perhaps than old London Bridge, and being narrow and without a foot-path, a wooden foot-bridge was affixed to one side of it. Chaucer mentions Stratford-le-Bow in the prologue to his 'Canterbury Tales:'—

> "Frenche she spake full fayre and fetisly,
> After the scole of Stratford atte Bowe,
> For Frenche of Paris was to hire unknowe."

Bow church, which stands in the centre of the road on the London side of the bridge, is an ancient edifice, having been erected in the early part of the fourteenth century. It was thoroughly repaired a few years back; before the reparation its appearance was most venerable. It is still an interesting structure.



[Tottenham High Cross.]

After leaving Bow our river flows past Bromley, whose church, situated at a very short distance from that of Bow, is a little countrified building. But by this time our river has ceased to be either picturesque or interesting: lime-kilns, calico-printing and chemical works, and distilleries are the most prominent objects along its banks; and however useful these may be, they are not agreeable to either nose or eye. The walk, indeed, after passing Bromley-mills is pretty—the Thames with its shipping and Shooters' Hill as a back-ground, serving to produce some rather striking pictures. But we must pass onwards; our river is crossed near Blackwall by an excellent iron bridge; and, leaving the East India Docks a little on its right, it soon unites with the Thames—having, however, first lost its name, which it has changed for that of Bow.

* This is the same Matilda who built the bridge at Cobham mentioned in our account of the Mole, *ante*, p. 149.

Creek. It enters the Thames somewhat below the terminus of the Blackwall Railway, and opposite the Greenwich marshes. Here then we part with the LEA; and though we have perhaps found nought in it to arouse our minds to feelings of grandeur, we have not wanted for that which has served to excite pleasurable sentiments, and to call up many agreeable associations. We almost, indeed, feel tempted in quitting it to apostrophize it as did Moses Browne in his 'Piscatory Eclogues:'—

"Sweet stream,
Whose scenes to solemn thoughts invite,
May our calm life resemble thee,
Such pleasure give, so useful be!"

USES OF THE DIAMOND IN THE ARTS.

THE diamond, like most other natural productions, is applied to various uses in the arts of life, according to the facilities afforded by its chief qualities or characteristics. Most of these uses, as we shall see by the following details, depend on the excessive hardness of the diamond, a hardness greater than that of any other product, either of nature or of art. It is to a series of papers written a few years ago, by Mr. Turrell, that we shall be chiefly indebted for our notice of this subject.

As an article of jewellery, we cannot speak of the diamond as an *useful* substance so much as an *ornament*: but the very operations which bring the diamond into an ornamental form are such as illustrate the uses of the diamond in other respects, so that it in some measure belongs to our present purpose. When a rough diamond, such as exists in nature, is prepared for ornament, it is brought into one or other of the four forms called *brilliant*, *rose*, *table*, and *lasque*. The brilliant is held in the highest estimation, as it is the form which shews to the greatest advantage the peculiar lustre of the gem; its shape may be said to consist of two truncated pyramids united by one common base, the upper pyramid being much more deeply truncated than the lower; and the surface is cut away in *facets* or small flat surfaces in such a manner as to reflect light very brilliantly. The rose diamond is the form given to those gems whose depth or thickness is too small to allow them to be brilliant-cut; it is produced by giving to the surface of the diamond a series of little equilateral flat surfaces or facets. The table diamond, being still thinner than the rose, has a flatness of form which gave rise to the name. The lasque is a peculiar form given to the diamond in India.

Now to give these various forms to the rough diamond, a laborious and skilful process of splitting, cutting, and polishing, is followed. The diamond can only be rubbed or worn away by another diamond, but it may be *split* by other means. The splitting is usually preparatory to the cutting and polishing. To effect it, the diamond is fixed into a ball of cement, about the size of a walnut; the cement is formed of a kind of resinous substance brought from Holland, and the diamond is imbedded in it (while warm) so far as to leave uncovered that part which is to be separated. Another diamond, having a sharp edge, is fixed in another ball of cement, and with this edge a slight gap or notch is made in the stone to be split. Into this notch is placed the extreme edge of a blunt razor blade, and a smart blow with a hammer splits off the portion of diamond which projects beyond the surface of the cement. If a notch were not first made by another diamond, the edge of the razor would yield without splitting the gem; and even with this notch the process requires much dexterity and previous arrangement.

Then comes the more tedious and elaborate process of cutting or grinding the facets on the surface of the diamond. The diamond is imbedded in a ball of cement, fixed at the end of a stick, that part of it being left exposed which is to be worked. Another diamond, also about to be cut, is imbedded in cement at the end of another stick; and the two diamonds are rubbed against each other in a very singular manner. The workman has before him on a bench a very small mahogany box, on the top edge of which is a rim of steel, with two steel pins rising perpendicularly; these pins act as fulcia against which he holds the sticks, and he rubs the two diamonds very forcibly against each other until each one has worn away a portion of the surface of the other. "Diamond cut diamond," has become an adage, and it is certainly true that this gem can only be worn away by one of its own kind. The fine dust which is worked off in this process, and which is called *diamond powder*, is so valuable a commodity in some of the arts, that every grain of it is preserved with scrupulous care: the workman holds the two diamonds over the small box, and the powder falls on a perforated steel plate, through the perforations of which it falls into the lower division of the box. When one facet has been produced on each stone in this way, the stones are removed from the cement, and readjusted in a new position, for the renewal of this slow and tedious process.

When the facets are produced, the polishing of the diamond next ensues. The diamond is held in a manner different from that just described; instead of being imbedded in cement, it is imbedded in pewter or fusible metal, to such a depth as to leave no part exposed but the facet which is to be polished. The pewter is contained in a little hemispherical cup, and together with it forms the *dop*. This dop is placed, with the diamond downwards, on the surface which is to polish it. A circular cast-iron plate, called a *skive*, about a foot in diameter, is first turned flat and true in a lathe, then slightly roughened with grit stone, and then fixed to a lathe or mill so that it may rotate rapidly in a horizontal direction. Some diamond-powder mixed with olive oil is spread on the upper surface of the skive, and the dop is laid on with the diamond in contact with this surface, a weight more or less heavy being pressed on it. The skive being then made to rotate, the continued friction between the diamond and the layer of diamond-powder polishes the little facet on the former. The minute precautions requisite in this process are quite remarkable.

Thus it will be seen that in splitting, in cutting, and in polishing the diamond, other diamonds, or fragments or powder of diamonds, are indispensable. The hardness of substance which renders this necessary gives rise to the other uses of the diamond in the arts. For these purposes such stones as are too small or too badly coloured to be used for jewellery are appropriated; they are called by the general name of *bort*, and from this bort the glass-cutters, glaziers, seal-engravers, dentists, copper-plate-engravers, lapidaries, chinamenders, and mathematical-instrument-makers, derive advantages which no other substance could give them.

The process of cutting glass by means of the diamond is a curious one. Dr. Wollaston wrote a paper on the subject, in which he observed:—"When we consider how long the diamond has been in common use for the purpose of cutting glass, it is rather surprising that no adequate explanation has been given of that remarkable property, and that even the conditions on which the effect depends have not been duly investigated. Many persons, indeed, are not aware of the distinction that is to be drawn between *scratching* and *cutting*. In the former, the surface of the glass is torn into a rough furrow; in the latter, a small fissure or superficial crack is made, which should be continued without interruption, from one end to the other of the

line in which the glass is intended to be cut. The skilful workman then applies a small force solely at one extremity of this line, and the crack which he forms is led by the fissure, almost with certainty, to the other. Another substance, harder than glass, possesses the power of *scratching*, in common with the diamond. But the power of *cutting* has been thought confined to the diamond; and it is true that its peculiar hardness certainly contributes to the duration of that power." The diamonds selected for this purpose are such as are in the naturally crystallized state, without having been cut or ground by art. It is supposed that the natural edges which divide the planes of crystallization are more calculated to cut the glass than any artificial edges. The actual cutting is effected only at the extreme surface of the glass, and consists in a fissure of exquisite minuteness, which serves to guide the rent whereby the complete severance of the glass is brought about. There is a particular direction in which the diamond must be applied to the glass in order to make a cut, any other direction enabling it merely to scratch and not to cut; and those who are employed in setting diamonds for this purpose so adjust them in their handles that the user may be guided in the proper way of holding them.

The minuteness of the fissure made by the diamond has given rise to some remarkable and beautiful ornaments, called *iris* ornaments. Mr. Barton, of the Royal Mint, some years ago constructed a delicate machine by which he could make, with the point of a diamond, two thousand lines in an inch, on a surface of hardened and polished steel. Such lines, by a peculiar property in the reflection of light, produce a brilliant series of colours over the whole surface of the plate, although the lines themselves are wholly invisible to the naked eye.

The jewelling of watches is an occupation in which the diamond is always employed. It is not that the diamond itself is always made to form part of the minute mechanism of the watch; but it is employed as a working-tool where no other working-tool would be available. The numerous little pivots in a watch, connected with the various wheels, if they worked in holes formed in pieces of metal, would soon wear away the metal, and become disarranged. A harder substance is therefore provided for the pivot-holes, and this substance is generally a gem so hard that it can hardly be worked into form by any means but by the diamond. The small fragments of ruby or other gems are first cut or slit into thin plates, then pierced by very fine diamond drills, then brought to a circular form, and lastly have the holes polished by means of diamond-powder. The diamond is the effective agent in all these processes; for diamond-powder is applied to the edge of the metal wheel whereby the ruby is split, a minute fragment of diamond is used as a drill to pierce the hole, diamond-powder is used to grind and polish the surfaces of the thin plates of ruby, another fragment of diamond is used as a turning-tool to give a circular form to the ruby, and diamond-powder is again used to polish the hole pierced through it. The fragments of diamond used as cutting-tools in these processes are so excessively minute, that it requires the utmost delicacy on the part of the workmen to manage them, and fix them to the various pieces of apparatus.

Copper-plate-engravers frequently find it necessary to increase the strength of their tints, by re-entering the lines with a point; and this is commonly effected by the common steel etching-point, ground or set to a particular form. Many of the eminent engravers of recent times, however, employ a diamond for this purpose, on account of the want of durability in steel points, whereby the tints become very unequal. A small fragment of diamond is brought, by the use of diamond-powder, to the required form, and is fixed at the end of an appropriate handle. These diamond points are sometimes very useful in etching, and also in ruling parallel lines in particular parts of a plate.

Mr. Barton employed the diamond very successfully as a turning-tool. On one occasion, at the request of Mr. Troughton, he succeeded, by means of a small diamond tool, in cutting from a cylindrical surface a quantity not more than a twelve-thousandth part of an inch in thickness!

Jewelled draw-plates for wire are another production which we owe to the diamond. It is pretty well known that all kinds of wire are made by drawing a rod of metal through a hole somewhat smaller in diameter than itself, the metal being squeezed and compressed while passing through the hole. It is a natural feature in this arrangement, that the plate in which the hole is bored must be harder than the metal which is to be formed into wire; and it is easy to imagine that the substance of the plate must have a tendency to wear away rapidly. In making fine wire the hardness of the draw-plate is of especial importance; and hence the employment of hard gems and precious stones. Rubies have been sometimes so shaped as to give form to steel pendulum wire for chronometers; and the ruby, the cryso-beryl, and other gems, have occasionally been employed as draw-plates for the production of very fine wire. In all such cases it is by means of drills made of small fragments of diamond, or diamond-powder, that the gems are prepared for this purpose.

The diamond has been used as a lens for microscopes, and as a tool for shaping other gems into the form of lenses. Sir David Brewster was the first to suggest the employment of gems in this way; Mr. Hall of Edinburgh was the first to make lenses of ruby and of garnet; and Mr. Pritchard was the first to make a similar application of the diamond. The lenses made of these costly materials have optical properties which render them especially valuable for microscopic purposes; but the amount of labour and of skill involved in their production is truly enormous, and strikingly illustrates the hard texture of these gems. Sir David Brewster states that fifty or sixty hours' incessant working are necessary to bring a diamond to the required form for a double-convex lens for a microscope.

The last mode of employing the diamond to which we shall here allude is in the process of seal-engraving. This is a singular operation, in which diamond-dust is the real working agent. The cornelian or other piece of stone which is to form the seal has the device first slightly sketched on it, and the device is then worked in intaglio by means of small tools touched with diamond-dust mixed with oil. The small tools, which are made of iron, and which are variously shaped according to the kind of cuts to be produced, are made to rotate very rapidly by means of a lathe; and the engraver, holds the piece of stone in such a position as to be acted on by the small tool, viewing the progress of his labours by means of a magnifying-glass. The diamond-powder, applied to the surface or edge of the tool, cuts away the stone; but, as may be supposed, great delicacy, and great variety of tools, are necessary to the production of the very minute lines which form the device in a seal.

It will thus be seen that the excessive hardness of the diamond gives it an extensive range of usefulness in the arts.

ON THE TERMS STANDARD, STERLING, AND CARAT.

[Concluded from p. 240.]

HENRY VIII. was the first English monarch who appears to have adopted this unworthy course. Notwithstanding the immense wealth which his father left

him, it was dissipated in a few years by the prodigal expenses of the youthful monarch. He issued numerous proclamations from time to time, stating the current value that should be placed upon coins; which current value, to suit the king's object, became more and more in excess of the real value. It was always a present advantage to the king when these changes were made, because it lessened the intrinsic value of the payments to be made from the treasury; but as the government was sure in the end to share the loss with the public generally, the advantage became only temporary, and the plan was therefore renewed from time to time. The object was generally wrought out by declaring how many pounds sterling (represented by the symbol £) should be coined from a pound weight troy (lb.) of pure gold; and how many shillings from a pound weight of pure silver; so that alloy had to be introduced in sufficient quantity to make the coins of nearly the usual size and weight. At one time a pound troy of pure gold was to be made into about 28*l.* coinage, then into about 33*l.*, then into 36*l.*; so that a lb. of gold bore a varying relation to a £ in money, whereby the commercial arrangements of the country were quite disarranged.

The standard of silver was debased in a yet greater degree. At one time forty-four shillings were to be coined from a pound weight of pure silver; then about fifty-eight, then ninety-six, and at length a hundred and forty-four; that is, although the coin called a shilling continued to be of the same weight, yet by varying the quantity of the alloy of copper (whose value in this way is too insignificant to be taken notice of), the silver became less and less in quantity in the shilling, and the intrinsic value proportionably reduced.

When Edward VI. succeeded his father, the regency continued this pernicious system; but the young king set about restoring the standard by degrees. Many of the changes were of a complex character, since both weight and fineness were taken into account in the determination of the value of each coin. It is therefore only by taking both qualities together that we can compare the coins of different periods. The relative value of the precious metals to each other, and to other commodities, has also greatly varied; so that taking all these things together, the changes may perhaps best be shown by a few examples, thus:—one pound troy of the silver which happened to be standard at the time, was coined into 1*l.* 1*s.* 4*d.* in the time of William the Conqueror, 2*l.* in the reign of Edward IV., 3*l.* in the reign of Elizabeth, 3*l.* 6*s.* in modern times; one pound troy of standard gold (the particular standard adopted at the respective times) was coined into 14*l.* 0*s.* 10*d.* in the reign of Edward III., 22*l.* 4*s.* 6*d.* in that of Edward IV., 36*l.* in that of Elizabeth, 44*l.* 10*s.* in that of Charles II., and 46*l.* 14*s.* 6*d.* in recent times; while the relative value of silver to gold was 1 to 12 in the time of Edward III., 1 to 10 in that of Edward IV., 1 to 5 in that of Henry VIII., 1 to 11 in that of Elizabeth, 1 to about 14½ in modern times.

We thus find that the term *standard*, which ought to mean an invariable model for general reference, has been subject to many fluctuations; but its present meaning in England may be put in a condensed form, thus:—

1. The standard of fineness in gold coinage is attained when there are 11 parts of pure gold to 1 of alloy.
2. The standard of weight in gold coinage is attained when 46⅔ sovereigns are coined from one lb. troy of standard gold.
3. The standard of fineness in silver coinage is attained when there are 37 parts of pure silver to 3 of alloy.
4. The standard of weight in silver coinage is attained when 66 shillings are coined from one lb. troy of standard silver.

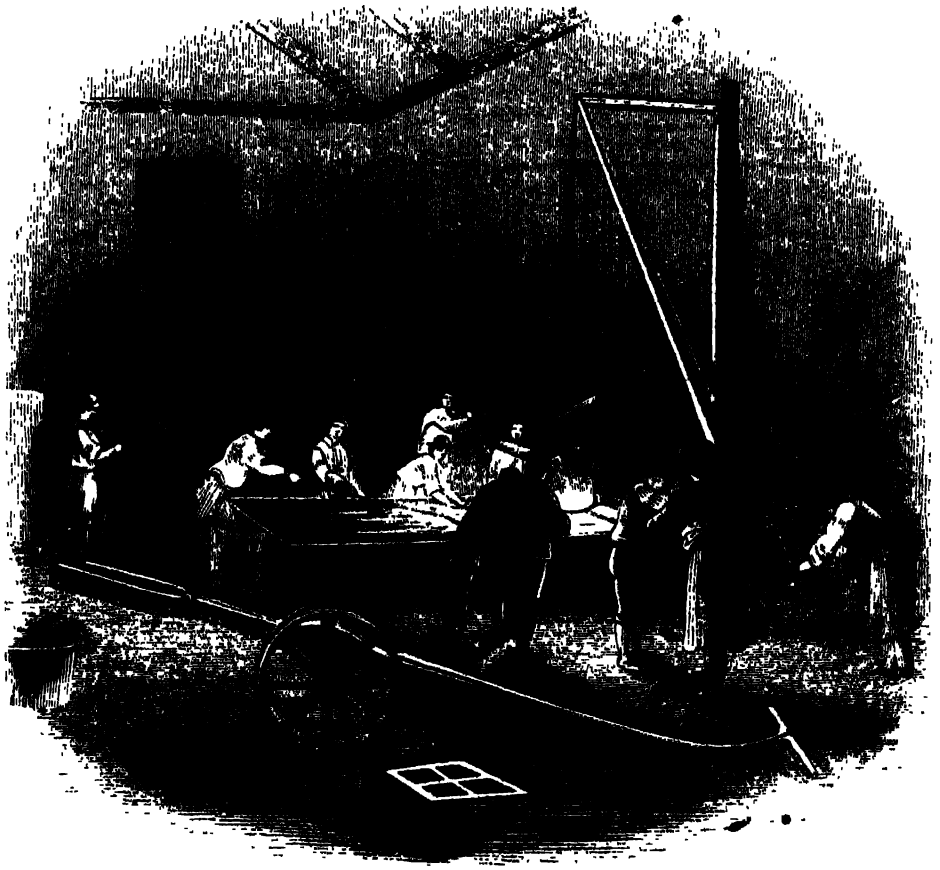
The word *sterling* is another of those employed in relation to money matters, and one concerning which there has been much diversity of opinion. Whenever or by whomsoever the term was introduced, it has always been used to express the lawful current money of England, and it is so understood all over the Continent. It seems to have been intended at first that a pound weight in silver and a pound tale in money (that is, lb. and £) should be equal and equivalent; but this equality was soon departed from, and the word sterling came to indicate the current coin, whether it departed much or little from the relative position with respect to silver.

The opinions concerning the origin of the word 'sterling' have differed in the most extraordinary degree. Some writers have deduced it from a company or body of merchants called *Easterlings*, who shortly after the Norman Conquest were employed in regulating the coinage. Others trace the word to *stare* or *sterling*: others think it comes from *little star*; others deduce it from the name of the town of *Stirling* in Scotland. Others from an Anglo-Saxon word for a *rule* or *standard*; others from an Anglo-Saxon word denoting a royal or noble standard; but the greater number who have touched on this point, including Stow and Camden, seem to think that the derivation from *Easterling* is most likely to be the correct one. The date at which the term was first used has been not less a subject of controversy; the times stated by different writers being A.D. 860; A.D. 928; about William the Conqueror's time; about Henry II.'s time; in the 33rd of Henry II.; in the reign of Richard I.; before the reign of John; before or in Henry's III.'s time; in Henry III.'s reign; in Edward I.'s reign.

But whatever be the origin of the word sterling, or the date of its introduction, we shall be pretty nearly correct in saying that it is a short expression for the words "English coined money." In the year 1606, when a little confusion arose in Ireland from the use of silver coins of different standard, and from the words "sterling money" being applied to both kinds, it was ordered that that kind only which corresponded with English money in standard should be called *sterling* or *sterling money*, while that of a different standard should obtain the name of *current* or *Irish current money*. This example conveniently illustrates the general meaning of the word sterling.

The Junction of the Indus and the Cabul.—We walked to the banks of the Indus to see its junction with the Cabul river, a stream of equal breadth with itself, but inferior in volume. At their confluence the water was lashed into a sea of breakers, dashing over rocks and whirling in tremendous eddies, sufficient to have swamped a tolerably large boat; but the scene, as it was presented to our view, no doubt owed much of its grandeur to the accumulated rain that had fallen during our stay at Boochán, and may be very similar to what it assumes during the periodical monsoons. Both the streams were considerably swollen, and opposed strong contrasts to one another, the Indus being perfectly clear and pure—the Cabul river, thick and muddy; the discoloured water of the latter being distinctly traced for two or three hundred yards below the spot where it flows into the Attock. We watched this deeply-interesting picture from some overhanging rocks, which bear on their surface such a high state of polish, that they have the appearance of being perfectly wet; but it arises, I conjecture, from the constant trituration of the sand, washed upon them during the rainy seasons. From the sharpness of their angles, and the darkness of their hue, I concluded they were composed of an extremely hard stone; but a few blows from a stick easily separated a portion, the fractures assuming regular shapes of a slaty substance.—*Lieut. W. Barr's Journal of a March from Delhi to Peshawur, &c.*

A DAY AT A GLASS-FACTORY.



[Plate-glass Casting, Messrs. Cookson's, South Shields.]

IN the Supplement for May it was stated that *glass* is one among the staple manufactures of Newcastle and its vicinity. To this subject we shall direct our attention on the present occasion.

The settlement of this important branch of manufacture on the banks of the Tyne may be attributed to the same causes as that of so many other departments, viz., the cheapness of coal and the great facilities for shipping off the produce. Of all the glass made in this country, a very large proportion indeed is produced on the Tyne or the Wear. This, combined with other causes, has given rise to a curious circumstance, which is apt to escape the notice of general observers. The coals, the pottery, the glass, the chemicals, and other produce of the district, employ an extremely large number of vessels for their transport to London and other parts of the kingdom. On the other hand, the produce transported from London and these other ports to the Tyne is comparatively small in quantity; so that the vessels require a large quantity of ballast to place them in sailing order on their return voyage. This ballast is composed of river-sand, obtained at a cheap rate from the dredging of the rivers; and when it has enabled the vessels to reach the Tyne, the purpose of the ballast has been answered. But matters do not end here: the vessels must be emptied, and the ballast must be deposited somewhere. It must not be thrown into the Tyne, and therefore it is deposited on the banks, where huge heaps have in time collected, two or three hundred feet in height. So important is this matter deemed to be, that a district has been purchased within the last few years on the sea-shore, and a railway a mile in length constructed from thence to South Shields, as a means of depositing, in a spot not required for other objects, the ballast taken out of the ships at South Shields. The owners of the vessels pay a certain price per ton for all the ballast thus taken off their hands.

The glass manufacture is a good deal subdivided. There are flint-glass, crown-glass, plate-glass, broad-glass, sheet-glass, and bottle-glass; each one being regarded in some respects as the object of a distinct department of the manufacture, involving its own kind of ingredients and its own routine of processes. There are, of course, certain general principles which pervade them all, without respect to the minor differences among them; and a consequence of this is, that three or four of these are sometimes undertaken by one firm. In the Supplement for February, 1841, a description was given of the operations in a Flint-Glass Factory in London; and we have now an opportunity of glancing at most of the other departments, through

the courtesy of Messrs. Cookson of Newcastle, who carry on, at that town and at South Shields, a very extensive system of manufacture in four of the above-mentioned branches, viz. *crown*, *plate*, *sheet*, and *bottle* glass.

A glass-work is generally distinguishable from most others by the conical form of the kilns or furnaces; those bulky erections which contain within them both the fire-places where the glass is melted, and also the space in which, and the apparatus by which, the men work. The Works now under our notice sufficiently exemplify this arrangement. On proceeding from Newcastle to South Shields by the Brandling Railway, the works are seen occupying a large area of ground near the terminus of the railway; the groups of kilns and chimneys giving forth the usual accompaniment of such places—an abundance of smoke. When within the Works, there is evidence enough that many of the buildings are very old; and as we approach the river this is the more observable. The establishment, taken as a whole, is one of the oldest in the district, dating back its origin to so early a period as 1738; and the various clusters of buildings seem as so many marks, to indicate the times when, and the extent to which, the operations have been enlarged. To begin at the beginning: there are the wharfs on the river-side, where the crude materials for the manufacture are landed from the shipping, and where the cases and crates of glass are despatched off per ship. Then there is the large cool building, or part of a building, in which the glass-melting pots are made—those important vessels on which the safety of the melted glass depends; and in connexion with this are the ovens where these pots are baked. Next are the furnaces for the crown-glass manufacture, with the accompanying annealing ovens, and all the arrangements connected therewith. Wholly distinct from these are the more delicate and important arrangements connected with the melting, the casting, and the annealing of plate-glass. The neat and comparatively limited department in which the sheet-glass is made, and the somewhat ruder arrangements which will suffice for the bottle-making, are again distinct. Then there are the large warehouses in which the tables of crown-glass are packed in crates, the plate-glass in cases, and the other glass in appropriate ways. Lastly, there are, as is usual in large factories, various workshops for different kinds of artificers, whose services are necessary to keep the apparatus in working order. The many-storied and many-windowed buildings which are characteristic of the textile manufactures, are not to be looked for at a glass-work—all is necessarily more "in the rough;" and we must be prepared to meet with swarthy workmen, a sooty atmosphere, highly heated buildings, and a labyrinth of scattered erections.

The chief features presented by the various buildings will be best understood by glancing at the operations of which they are the scene; and we will therefore at once proceed to notice the manufacture of

Crown-Glass.

Whatever may be the origin or fitness of this name, the glass so designated is that with which windows are generally glazed in this country, and which is also generally employed for framed prints and drawings. It is always made in a circular form, rather thicker at the circumference than elsewhere, and having a knot or protuberant bulb in the centre. This is certainly a very unfortunate shape for such glass to assume; since, as the central bulb must always be cut away, and as the glass is nearly always used in a quadrangular form, there is a very serious amount of loss in cutting up the glass for use. The other kinds of glass, as we shall see further on, are not exposed to this disadvantage; but, on the other hand, there are counterbalancing advantages which lead to a much larger manufacture of crown glass than of plate, broad, or sheet glass, and indeed greater than of all these taken together.

It happens in this as in most other departments of manufacture, that each firm adopts its own peculiar views as to the choice and proportion of the ingredients employed. And indeed this is especially observable in the glass manufacture; for it involves such a remarkable chemical union of heterogeneous substances, that it may be deemed an experimental art, the experience derived from past trials being made the ground for future ones. It will be sufficient, however, for our purpose, to say that the ingredients for crown-glass usually comprise the following:—clean white sand, soda or potash, lime, and a very small quantity of one or two other substances. For shortness we will say that the ingredients are sand, alkali, and lime: the first two really constitute the glass, while the lime acts as a flux to enable the others to melt and combine more readily.

This union of sand or flint with an alkali, as the chief circumstance involved in the production of glass, is observable in the legendary account of the discovery of glass as given by the early writers. According to this story, there was on one occasion a merchant vessel, laden with nitre (one form of the alkali potash), driven ashore on the coast of Palestine, near the mouth of the river Belus, a small stream running from the foot of Mount Carmel into the Mediterranean. The mariners, unable to procure stones to rest their cooking-vessels upon, used pieces of the nitre instead. The fire reduced the alkali to a soft state, and enabled it to incorporate with the river sand, forming together a stream of liquid glass. The circumstance was communicated to the inhabitants of the district, who availed themselves of the hint, and established a manufacture of glass. Whether or not we choose to place credence in this story, certain it is that alkali and sand, wherever found and however melted together, form the bases of all the glass with which we are acquainted.

Of these ingredients, the sand is obtained chiefly from the neighbourhood of King's Lynn in Norfolk, where a very fine and white sand is found on the seashore. It is also procured from Alum Bay, in the Isle of Wight. "It was not always usual to employ sand for this purpose, for flints used to be selected instead; as, however, it was found that sand answered the purpose, and saved the trouble of calcining and grinding the flints, the latter gradually became superseded by the former. The term *flint*-glass had its origin from this employment of flints in its manufacture. With regard to the alkali employed, this has been affected by the circumstance alluded to in our notice of Chemical Works, viz., the substitution of salt for kelp as a source of soda. In former times, the glass-makers used to employ large quantities of kelp, which they procured from Scotland; it was an impure carbonate of soda, which gave off its carbonic acid and its impurities by the action of heat, and entered into the composition of glass in the state of soda. But as now obtained from common salt, the carbonate yields a much larger amount of pure soda for a given price, and has thrown into shade the use of kelp for this purpose.

Before the ingredients are actually mixed in the melting-pots, they undergo a preparatory operation called *fritting*, the object of which is to fit them to form a more homogeneous compound. This is effected in a kind of oven, very shallow in proportion to its area. The sand is first washed clean, and exposed for several hours to the action of a strong heat; then, while hot, it is plunged into cold water, which splits the grains of

sand to a still smaller size, and enables them to combine more readily with the alkali. The fine sand and alkali being then mixed together, the mixture is placed in the shallow oven, or 'calcining arch,' where it is exposed to a heat which brings it to the liquid state; and by being constantly stirred for some time while in this state, it undergoes considerable change: the moisture is driven off, the carbonic acid is expelled from the alkali, the carbonaceous particles are burned away, and the ingredients are brought into chemical union. The mixture, which now obtains the name of *frit*, is taken from the oven, spread out upon a plate of iron while yet hot, and is divided into large cakes before it becomes quite cold.

It is from this frit, then, that the glass is made. The frit is melted in pots of very large size, and requiring peculiar care in the manufacture. We have on other occasions, such as in relation to the steel manufacture, had to speak of the carefully wrought vessels of Stourbridge clay, which are required to endure a powerful heat: and in the glass manufacture the same is observable, except that the vessels are very much larger and are made wholly by hand. In one of the buildings the potters are always at work producing these vessels —preparing and kneading the clay, making it into oblong pieces, laying these pieces round the vessel one at a time (as a bricklayer might the bricks in a wall), and working each piece so that it shall adhere closely to those which preceded it. The pots are allowed to remain many months slowly drying in the air, and are then gradually exposed to an increasing heat, in appropriate ovens or furnaces, till they are baked and annealed sufficiently to bear the fierce heat of the working furnace.

To this furnace and its busy operations we will next direct our attention. Those who have never been in what is familiarly termed a 'glass-house' may have some difficulty in understanding the mode in which it is arranged. Imagine then a large room or building with a furnace in the centre, having several mouths or openings to the furnace, and the melting pots just within these mouths, enveloped in a fierce heat. A passage is left open around this furnace, where the workmen take up their stations; and on the other side of this passage are the openings to numerous ovens or furnaces, wholly distinct from the central furnaces. If we therefore picture to ourselves a pathway going round a central furnace, and being itself bounded by other furnaces, we shall form some conception of the kind of place where the glass-makers work. To say that they are "between two fires" is only part of the truth; they are between and adjacent to a dozen fires, and become exposed to the action of one as soon as they leave another. There is very little light in the glass-house except what is derived from the opened or partially opened mouths of the furnaces; and as the men go flitting past these fiery spots—now exposing their brawny figures to the full glare of the light, and now involved temporarily in shade—they form items in a picture replete with striking effects. If each man stood in one spot, and made a piece of glass by his own work, the picture would approach nearer to one of 'still-life;' but they are continually passing to and fro. A piece of glass goes from hand to hand, probably a dozen times in the process of making, travelling along from one furnace to another, and receiving at each spot and from each man some modification in its form. Heat, bustle, and dexterity are, in fact, the three features which attract our attention.

The frit is placed in the pots, together with a portion of 'cullet,' or broken glass; and both together are exposed to an intense heat, whereby they are melted into a liquid glass. The impurities rise to the surface, and are then skimmed off by the aid of an appropriate instrument. The glass (or 'metal,' as it is technically called) is not in a workable state when quite liquid; but by slackening the heat a little, the glass becomes slightly viscid, and is in that state fitted to undergo the remarkable operations which constitute crown-glass making.

As each table or circular piece of glass requires only a few minutes in making, but demands the services of several workmen, all place themselves in readiness to act their parts in the scene. The first man, called the *gatherer*, approaches one of the furnace-mouths, and dips into the melted glass the end of an iron tube six or seven feet in length; he turns the tube gently round, until he has gathered a pound or two of pasty glass on its end; he allows this to cool a little; then dips it again, to increase the quantity; then allows this to cool a little; and so on, until he has gathered a mass of nine or ten pounds of the paste-like and fiery-coloured glass on the end of the tube, turning the tube all the time to prevent the glass from falling off it. He holds this mass perpendicularly downwards, to make it elongate somewhat beyond the end of the tube; and then rolls it to and fro on a smooth iron plate called a *marver*, to give a cylindrical form to the protuberant mass. The man (or an assistant) then blows through the tube, by which the glass is made hollow within, and brought to something like a pear-shape. It is then handed to another man called the blower, who heats it at the mouth of a furnace two or three times, and after each heating blows it and rotates it; till at length he so enlarges the size of the mass of glass and reduces its thickness as to present it in nearly a globular form. The side opposite to the tube is then slightly flattened, by being pressed against an iron plate; and the glass is transferred from the tube to a rod in a remarkably dexterous manner the blower holds the tube horizontal, while another man collects a little melted glass on the end of an iron



[Transferring from the tube to the pontil.]

rod called the *pontil* or *punty*, and applies this to the middle of the flattened surface of the glass, exactly opposite the tube, which latter is immediately afterwards detached by touching the point of junction with a piece of iron wetted with cold water. This transference from the end of the tube to the end of the rod is effected so quickly and neatly as to form one of the prettiest parts of the operation.

We have, then, up to this point, a flattened globe of glass fixed to an iron rod at the flattened side, and

having a small hole on the opposite side, occasioned by the detachment from the tube. How this is transformed into a flat circular sheet is the next point to notice. The workman holds the pontil so that the glass shall be exposed to the heat of a furnace, at one of the mouths or openings called by the men a 'nose-hole.' He rests the rod at one particular point on a bar which serves as a support or fulcrum; and keeps the glass rotating while exposed to the heat. As the substance of the glass becomes hotter and softer, it yields more readily to the centrifugal force engendered by the rotation: it becomes every moment broader and flatter, deviating more and more from the shape of a globe. The hole which the tube had before formed, and which was at first only about two inches in diameter, gradually enlarges by the same force, until it becomes three inches—six—twelve inches in diameter; and finally, the whirling action so completely masters the previous condition of the glass, that the flattened and misshapen globe suddenly 'flashes' (to use a technical term) out into a circular sheet four or five feet in diameter, nearly equable in thickness in every part, and being still attached to the rod exactly at the centre.



[Flashing-out the Crown Glass.]

This rapid succession of changes is to a bystander at once beautiful and inexplicable. The facility with which the pasty glass is worked into form, the hollowing of the mass by means of the breath, the maintenance of a particular degree of softness while exposed to heat, the transference from the tube to the rod, the steadiness of position maintained by the rotation, the expanding of the small hole in the centre, the flashing out into the flat circular form—all are very remarkable considered even singly, and form when viewed collectively one of the most striking series of operations connected with our manufactures. The glass changes hands more frequently than we have here noted; each man having by practice acquired the skill for one particular operation. It passes also round the central furnace from one opening to another, in order that each man may have a working-spot without interfering with the others. In the last process, that of 'flashing,' the heat and flame given out at the furnace mouth are very fierce, and throw a strong glare on the person of the workman, who stands partially behind a kind of screen, and who shields his face with a handkerchief or cloth.

The manner in which the circular table of glass is detached from the rod is not less neat and dexterous than the other parts of the operation. The rod is rotated for a few seconds after the glass has 'flashed,' at such a distance from the fire as to give the glass sufficient coolness to maintain its shape. The man then carries it a short distance, and places the glass down horizontally on a bed of sand, where the rod is detached from it in a moment by another man. The circular piece (having the 'knot' or 'bull's eye' in the centre) is then lifted up on a wide two-pronged fork, and placed upright in an annealing-oven. Here it is allowed to cool very gradually, whereby it becomes annealed, or loses some of the brittleness which would otherwise characterize it.

It will readily be understood that although a dozen men are thus engaged in making one piece of glass, there are many pieces under operation at the same time, each man taking up a new one as soon as he has handed over the previous one to the man standing next to him. There is thus a kind of endless chain, of which all the links are being made at once.

There is very little more which need engage our attention respecting crown-glass. The circular sheets, when cooled in the annealing-oven, are carried to the warehouse, to be packed in straw in the wooden crates which are familiar to most persons. Sometimes they are packed in the circular form; while in other instances the circle is cut into two unequal pieces, that one which contains the bull's eye or knot being called a *table*, and the smaller piece being called a *slab*. According to the colour, trueness, and flatness of the glass, it is divided into four kinds or qualities, which bring different rates of price in the market. Although some of the circular sheets are five feet in diameter, yet, owing to the curvature of the edge and to the central knot, a rectangular piece measuring three feet by two is nearly the largest that can be obtained from them.

Let us next take a similar glance at the manufacture of

Plate-Glass.

A better name than *plate*-glass would be *cast*-glass, since the former is vague in its acceptation, whereas the latter expresses the mode of manufacture. This kind of glass is *cast* or *founded* while in a liquid state, and is totally independent of the process of blowing. There was formerly, however, a kind of glass which resembled plate-glass in its general qualities, and which was produced by blowing instead of casting; but this has been almost completely superseded by the cast-glass of modern times. Blown plate-glass, like crown-glass, can only be made of small dimensions; but cast-glass has been produced as large as fourteen feet long by eight or nine in width.

The plate-glass, or glass (whether cast or not) which was to serve for mirrors, was originally a very favoured manufacture. Whether this kind of glass was known in early times is still matter of conjecture; but its manufacture was carried on by the Venetians some centuries ago, and so useful were the glass-makers regarded at one time at Venice, and so great was the revenue accruing to the republic from the manufacture, that, to encourage the men engaged in it, the senate made them all burgesses of Venice, and allowed nobles to marry their daughters; whereas, if a nobleman married the daughter of any other tradesman, the issue were not reputed noble. Again, in the early times of glass-making in France, the French government made a concession in favour of this manufacture, by decreeing that not only should no derogation from nobility follow the practice of the art, but that none save gentlemen, or the sons of noblemen, should venture to engage in any of its branches, even as working artisans. This limitation was accompanied by a grant

of a royal charter of incorporation, conveying important privileges, under which the occupation became eventually a source of great wealth to several families of distinction.

The plate-glass manufacture in our own day is remarkable for the small number of establishments in which it has been centred. There are, we believe, only four firms in England by whom plate-glass is made. It was seventy years ago that the first of these large works was established in Lancashire, and during the whole of the intervening period there have never been at any time more than three or four in operation. Newspaper readers have often remarked that the London daily papers remain the same in number year after year; porter-drinkers find that the great London breweries remain pretty equal as to number year after year; and it may be that the necessity for great capital and great experience will point to the analogous state of the plate-glass manufacture as well as to these. But be this as it may, the fact of the smallness of number is undisputed.

The plate-glass department at these works is a building of remarkable appearance within: very large, quiet, and so dark as to appear gloomy to those unaccustomed to the place, except indeed when a plate of glass is being cast, at which time a vivid and brilliant glow is diffused around. We must remark at once, that here the plates are only *cast*; all the important subsequent operations of grinding and polishing being carried on at other large ranges of buildings in Newcastle belonging to the same firm.

In the large building to which we alluded above there is a central furnace or group of furnaces, with a lofty open area extending three-fourths around it. Exterior to this is a series of annealing-ovens, several in number, the mouths of which are in what may be termed the wall of the room. Everything is on a much larger scale, and is more cleanly in its appearance, than in the crown-glass department. The most conspicuous piece of apparatus is the *casting-table*, a most carefully prepared plate of iron, with various mechanism to place it in any desired position. This iron plate measures seventeen feet by nine feet and a half, and gives a limit to the size of the glass that can be made upon it. Suspended above or near the casting-table is the apparatus by which the melted glass is poured upon the table; and there are other arrangements for working the pasty glass before it solidifies. On the floor of the building a railway is laid, along which the casting-table is wheeled from one annealing-oven to another, since it is necessary that the table should be placed close to the oven into which the plate is removed for annealing after being cast.

In the furnaces which occupy the central part of this great room the glass is brought to a liquid state. In the selection of the ingredients, in the purifying of them for use, in the proportions of mixing, and in the completeness of mixture, more care is bestowed in the plate-glass manufacture than in any other. A large sheet of plate-glass is perhaps one of the most perfect and beautiful of manufactured products, and requires experience and dexterity in every stage of its manufacture: its colour, its freedom from air-bubbles and from coloured specks, its regularity or freedom from veins and wrinkles, its equability of thickness, its freedom from mist or cloudiness—all require the closest attention on the part of the manufacturer. As to the ingredients employed, they so far resemble those used for crown-glass as to comprise sand, alkali, and lime as the three principal ones; but the minute details in respect to proportions and additional ingredients are of great nicety, and concern only the manufacturers themselves. It will suffice for our present purpose to know that the above three ingredients form by far the larger portion of the body of the glass.

The ingredients, then, being *fritted*, or partially combined in small furnaces, are placed in the melting-pots, together with a portion of *cullet*, or broken plate-glass. These pots are, like those for crown-glass, made with great care in respect to their power of bearing heat; but in their shape, and in that of the furnace in which they are placed, there are points of difference corresponding with the difference in the mode of working. When the red-hot liquid lava (if we may so term it) has arrived at a particular state, it undergoes an examination, which may be taken as an instance of the caution observed in the manufacture. Three men take a copper ladle having a long handle, dip the ladle in the melted glass in the furnace, and convey it to a small flat slab or tray, on which the glass is poured out. One man holds the handle, while the other two support the bowl of the ladle by cross-handles. The red-hot mass is so soon affected by the coolness of the air, that it assumes a thick pasty consistence when placed on the tray. A man then examines it, to see



[Examining the liquid glass.]

whether any slight differences of colour indicate defective spots: he knows from experience what are the causes of these spots, and in what way they will affect the purity of the glass when finished; he therefore removes them with the pointed end of a rod or tool, and leaves the rest of the mass in a uniform state. The mass is returned to the ladle, and the three men carry it back to the furnace. It is now put into different pots from those which before contained it, and thus these pots become filled with the successively examined portions. When the quantity has thus accumulated to the required amount for one casting (comprising several cwts.), the pots are exposed to a heat sufficient to bring all the glass to a liquid state.

It may be well supposed that a recognised order is observed in all these preparatory arrangements, so that while one potful of glass is going through the later stages, others are passing through an earlier stage. Thirty or forty hours are required for the melting and proper combination of the materials. It is not exactly a liquid state which is most proper for the casting; but after the perfect melting has taken place, the glowing mass is allowed

to lower its temperature a little, so as to acquire a slight degree of viscidity.

We will suppose, then, that this viscid state has been attained, and that the casting is about to take place. A group of fifteen or twenty men assemble round the casting-table, or between it and the furnace, each one having evidently a definite office to fill, at a particular spot and a particular moment. The *cuvette*, a vessel from which the glass is poured in the casting, remains in the furnace, of the same white-hot temperature as the liquid glass it contains; it having been filled by means of the ladle while in this situation. At the appointed moment, the cuvette is drawn out of the furnace by means of a crane; and the brightly glowing vessel is quickly swung round so as to be brought over the casting-table, very near the end which adjoins the annealing-oven. The foreman or director of the casting places himself in a particular spot; the men also take up their positions; and at a given signal the cuvette is tilted up so as to pour out its broad stream of golden lava on the casting-table beneath. A number of minor adjustments are then quickly made by the men, the principal of which consists in passing a heavy polished iron roller over the whole surface of the melted glass from one end of the table nearly to the other. This roller rests on two ledges or grooves equal in height to the intended thickness of the plate of glass, so as to spread out the ductile mass into an equable sheet: it is, in effect, a huge rolling-pin; and, like that well-known appendage to the kitchen, it gives a flattened form to a shapeless yielding mass. The appearances, meanwhile, are exceedingly splendid. The building being very dark within, the glowing cuvette throws a strong light on the faces and persons of the workmen, producing effects of bold relief which Rembrandt would have loved to paint: and while the white stream is pouring down, the reflected light is still more intense. Then, when the iron roller has passed over the glass, the surface of the latter presents a beautiful play of brilliant colours, comprising every imaginable tint; caused probably by a temporary oxidation of the surface by the coolness of the iron.

The quantity of glass cast at once depends on the size of the table, and is such as will make a plate more or less within those dimensions. There are so many probable sources of defect, that it is never known until after the plate is made whether it is so uniformly good in every part as to be retained in its largest dimensions: if not, it is severed where the defects occur, and is sold in smaller pieces. As soon as the newly-cast plate has solidified, the door of the annealing-oven is opened, and the plate of glass is dexterously thrust from the table into the oven. These ovens are very deep, so as to allow several plates to lie in them edge to edge. The oven is closed up very tightly after the glass is put into it; and there the heat is allowed to decline gradually for many days, so that by this slow cooling the glass may become annealed.

The ponderous iron casting-table will serve to supply all the annealing-ovens. It is wheeled on from one to another by means of the railway; and makes its circuit by the time the annealing is finished.

At this stage we quit the South Shields Works for a time, and follow the plates of glass to Newcastle, where they are ground and polished at two large establishments appropriated to these departments, and belonging to the same firm. Here everything is changed. The men are different, the buildings, the processes, the materials, the machines—all are so totally distinct as to appear like a different subject of manufacture altogether. In these buildings—which are situated in the western part of Newcastle, near the Carlisle Railway—the rough plates of glass are brought to the brilliant state in which we are accustomed to see them. As they leave the casting-table, they are rough and somewhat undulated, and wholly destitute of polish. They are cut to a rectangular form by means of a diamond, and conveyed to the grinding-room. This is an immense room filled with machines in a constant state of rotation: and the sand and water which are dripping around show that the process going on is not by any means a cleanly one. The plates of glass are cemented by means of plaster of Paris to flat beds or frames, and are in this state inverted one over another, so as to have the two plates of glass in contact. The upper one is so connected to machinery moved by a steam-engine as to have a rotatory motion given it; and by introducing between the plates some wetted sand or ground flint, each plate grinds the contiguous surface of the other. The plates are cast very much thicker than they are wanted for use, in order to admit of the surfaces being ground away till no defects appear; and this diminution sometimes extends to one-half the thickness of the plate. From time to time the flint and water are sprinkled on; and from time to time also the plates are removed to see how the process is going on. When one surface of each plate is ground, the plate is separated from the frame, and reversed, so as to expose the opposite side; and these new surfaces are then similarly ground one against the other.

The effect of this grinding is to remove all inequalities and to bring the glass to a perfect level; but it is not only deficient in polish, it is covered with scratches from the fragments of flint, and these scratches must be removed before the glass can be polished. To effect this emery-powder of several degrees of fineness is employed; the coarsest first, and so on to the finest. The smoothing by means of this emery-powder has the effect of removing all the scratches, and of producing a delicate dead-like appearance of surface, but without anything which can be termed a polish. This stage of the work is done by a large number of women, working on stone benches. During these successive stages of progress the two plates are made to grind each other, the upper one moving over and upon the lower; the intervening wetted emery-powder being changed from time to time, until a quality of exquisite fineness is finally used.

The last range of buildings, in which the glass is warehoused and packed in saleable form, contains the shops, in which the polishing is effected. In a room of great length there are numerous polishing-machines of remarkable construction. Each plate is laid down on a flat bed, and is rubbed over every part for a long period with a system of rubbers or polishers kept in motion by steam power. These polishers consist of oblong pieces of wood covered with cloth on which a kind of polishing paste is laid; and it is by repeated rubbing with these small pieces of apparatus that the plate receives its final brilliancy.

It would be in vain to attempt to enumerate the examinations which the plates undergo. In every stage of the manufacture the experience of the workman is called for, to determine whether any and what imperfections appear, and how they are to be removed; and as, on the one hand, no manufactured article would betray the existence of defects more readily than a large sheet of plate glass, so, on the other hand, the most sedulous attention is paid to the detection of such defects when they appear in the course of the manufacture. We need hardly wonder at the comparatively high value of plate-glass, when the risk and skill involved in the manufacture are duly estimated.

The *silvering* of looking-glasses is a distinct occupation, with which we have nothing to do here; but a few words of explanation may be offered. In the first place, the designation is a misnomer; there being no

silver used. A sheet of tin-foil is laid down on a flat stone or slate table, and on this is poured some mercury or quicksilver (whence probably the mis-appellation). The plate of glass, being first made perfectly clean, is placed on the liquid mercury, in such a manner as to expel all air-bubbles from between the two; and heavy weights are placed on the glass to force out the superabundant mercury from beneath. The whole is allowed to remain in a slightly inclined position for some days; after which it is found, on the removal of the weights, that the mercury has combined with the tin-foil, and that both together have adhered to the glass, forming what is commonly termed the 'silvered' surface, and giving origin to the brilliant reflection which is the object of the process.

We must now re-conduct the reader to South Shields, to glance at the manufacture of

Sheet-Glass.

This is to a by-stander one of the most inexplicable modes of glass-making. How the workman can possibly obtain a rectangular piece of glass in the way he does, is a sore puzzle at the first glance; and even after it has been witnessed several times, our admiration at the dexterity shown is not one whit lessened. In some of its features the mode of proceeding resembles that adopted in respect to crown-glass; but others are wholly different. Sheet-glass can be made larger in size than crown-glass, and is much employed for glazing large prints and drawings; it being in quality and in value a medium between plate-glass and crown-glass.

We may say of this, as of the former kinds of glass, that sand, alkali, and lime are the three chief ingredients, and that the preparation and melting are brought about in a manner nearly similar. The workman, when the glass is in a proper state of liquidity, gathers on the end of a tube the quantity of glass necessary for one process of making, and which depends on the predetermined size and thickness of the piece to be made. He rests this ductile mass in a horizontal position upon a wooden block, which has a hollow or depression calculated to give a cylindrical form to the mass. A fine stream of water is allowed to flow on the block, as a means of preventing the wood from burning, and of imparting a kind of brilliancy to the glass. The proper balance between the heat of the glass and the coldness of the water is one of the points to which the attention of the workman is directed. The blower raises the other end of the tube to his mouth, and blows the mass of glass into a hollow form, at the same time turning the mass round uninterruptedly in the block of wood. By this means the glass assumes a kind of globular form, eight or ten inches in diameter; and this is made the nucleus of a cylinder three or four feet in length, by a most remarkable train of processes. The workman holds the glass at the mouth of a furnace, to heat it to a certain degree of softness, at the same time keeping it rotating to prevent it from falling off the tube. He then lets the glassy mass hang downwards, and swings it to and fro in a recess or cleft in the floor of the shop. By this movement the globe, yielding to its own weight by the softness and ductility of its substance, elongates into a cylinder with hemispherical ends. Again is the mass heated and rotated, and again is it swung like a pendulum at the end of the tube; until, at length, the workman fairly swings it round in a vertical circle, at the imminent risk (as it seems to a looker-on) of shattering the cylinder into fragments. That the globe will elongate when softened and hung downwards, is what may be reasonably expected, and that it will remain hollow during this elongation is also easy to conceive; but that it should become almost a perfectly true cylinder from end to end, that the thickness should be the same in every part, that the diameter should be equable throughout a length of three or four feet, that the cylinder should solidify in this



[Sheet-glass making.]

form, and that it should remain all this time attached simply to the end of a tube, are results which few persons could anticipate, and which are even more remarkable as exemplifications of the skill of the workman than the 'flashing' of the circles of crown-glass.

The manner in which the two ends of the cylinder are made open and circular is curious. The workman stops the end of the tube, by which a certain quantity of air is enclosed in the cylinder; and by holding the remote end of the cylinder to the fire, the air within becomes so heated and expanded as to burst for itself a means of exit, by forming a small hole at the end of the cylinder. This hole, by heat and rotation, is expanded to the diameter of the cylinder; and thus one of the closed ends is rendered open. The other end is severed from the tube by first heating and then suddenly cooling a line round the circumference of the cylinder.

The quickness with which all this is done is not the least remarkable feature in the process. A few men soon accumulate around them a large assemblage of these finely formed cylinders (which may at an average be taken at forty inches long by nine or ten in diameter); and these are rested upright on the floor for a temporary period. But then, how to transform these into rectangular plates or sheets? In the first place, each cylinder is laid on its side, and a hot iron wire is drawn along the interior from end to end: the glass gives way at this line, and an opening is effected. Another workman next gradually warms the cylinder, and places it on a flat stone in a heated oven, with the crack or fissure uppermost; and in a short time the glass becomes so softened by the heat as to fall down by its own weight, spreading out into a sheet about thirty inches wide. While in this position the workman introduces into the oven an instrument formed of a piece of charred wood at the end of a handle, and with this he rubs the sheet of glass until it is made as flat as possible at the surface. After this, the sheet is placed up edgewise in an annealing-oven, and there kept to cool gradually.

It is worthy of remark that the workmen employed in this department of the works are foreigners. This kind of glass was made in Germany and France before being known in England; and as the quantity of it made is comparatively small, it does not seem yet to have been undertaken by English workmen, but to be still wrought by foreigners who have acquired the requisite tact and judgment by long practice. At all events, the earnings of the men are high, and there is a remarkable cleanness and neatness in their personal appearance: they have blue and white striped dresses, and contrive to maintain a tidiness both of person and of dress which is not a little commendable. In a kind of office or warehouse attached to the Works are a number of little glass instruments, ornaments, and trinkets made by these men, as specimens of delicate manipulation.

There is a kind of glass sometimes made, inferior both to crown and to sheet glass, called *broad-glass*; and this is manufactured in a manner somewhat analogous to that just described. But as no new features are involved in it, we may pass on to say a few words respecting the last sort which we enumerated, and which is designated, from its characteristic use, as

Bottle-Glass.

A greater weight of bottle-glass is made every year in England than of all the other kinds put together. Wine and beer bottles, pickle-bottles, oil-bottles, bottles for chemical liquids, &c. are required in such abundant quantity, that four or five hundred millions of pounds weight are made (and we may suppose broken) annually in England.

The materials for glass bottles are coarser and cheaper than for any other kinds of glass. Neither beauty of colour nor freedom from specks is of much moment for these articles, and consequently the alkali and other ingredients employed are the least costly. The mode of working differs from all the former instances so far as this—that the bottle receives it shape mainly from a mould. The bottle-house is perhaps more bustling than any of the other departments of the Works, since a considerable number of men may work in a small space. There is a kind of central furnace, containing the pots in which the 'metal' is melted; and around this is the vacant place where the men work, together with the moulds and other apparatus for aiding in the production of the bottles.

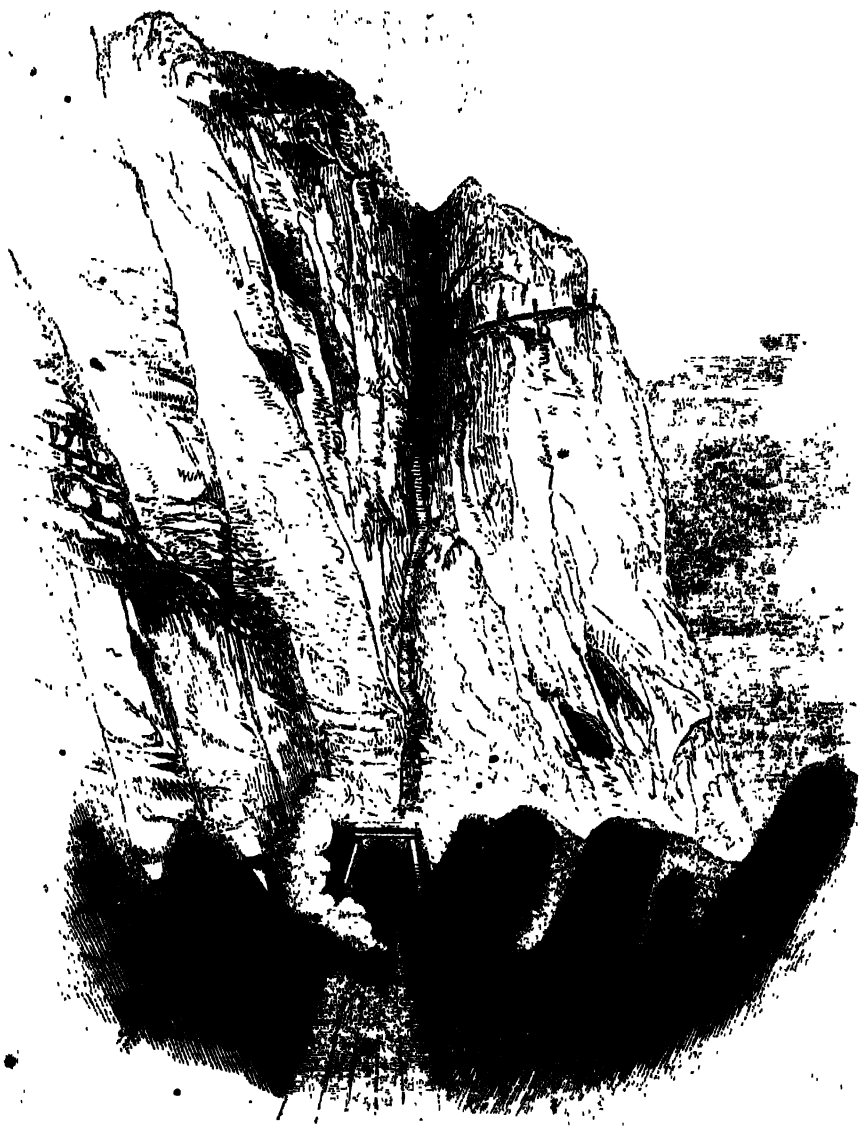


Glass-bottle making.

A workman (the *gatherer*) gathers on the end of a tube as much glass as will make (say) a wine-bottle. This he hands to another workman, the *blower*, who, whilst blowing through the tube, rolls the glass upon a stone, and elongates a portion which is to form the neck of the bottle. He then inserts the bulk of the glass into a brass or cast-iron mould, which gives the exterior form to the bottle; while, by continuing the blowing, he forms the internal cavity. The blower then hands it to the *finisher*, who further fashions the neck by putting on a little ring of glass, then trims the mouth of the bottle and gives shape to the bottom; and, lastly, detaches the bottle from the tube. A boy then lifts up the bottle on a kind of pronged fork, and carries it to the annealing-oven, where it is allowed to cool gradually.

This circle of operations is continued with much quickness, four or five men being able to make a hundred in an hour; and, with a few modifications according to the size, shape, and purpose of the bottles, may be taken as a general exemplification of the mode of proceeding. The vicinity of the Tyne and the Wear is abundantly supplied with many of the requisites for bottle-making; and hence the manufacture is there largely carried on.

Before concluding this slight notice of the Works which the kindness of the proprietors has enabled us to describe, we must say a word on a sad drawback to which the manufacture is subjected. Glass, as well as soap, is still among the substances over which the Excise officer holds control during the manufacture. As a question of pounds, shillings, and pence, between the leviers of the duty on the one hand, and the payers on the other, or as affecting the relation between home and foreign productions, these pages are scarcely a proper field for its consideration; but the point to which we allude is the injurious tendency which the system exerts on the manufacture itself. So close and binding are the restrictions, that a manufacturer can hardly make any experiments on a large scale, nor can he introduce any improvements except in a few minor details. Glass bottles *must* be made of a coarse kind of sand, whether the maker wishes it or no, on account of certain regulations as to the duty; plate-glass, being charged with duty by weight at a certain stage of the manufacture, is placed without the pale of certain improvements which the manufacturer might attempt, if he were not liable to duty for glass wasted in the experiment; every furnace, pot, oven, and warehouse must be registered; every 'charge,' or filling, must be under the control of the officers; every drawing out from the annealing-oven must be at prescribed hours; all crown or sheet glass must be limited to a certain thickness: in fact, as has been well observed, "from the making of the pots themselves, to the packing up of the glass for sale, everything is done after a certain manner, which is determined by Act of Parliament." It is not easy to see how skill can be developed in the extension of a manufacture so shackled; and indeed there is a homely proverb which might perhaps be brought to bear on this matter, that "Over carefulness sometimes kills."



[Abbot's Cliff Tunnel, Dover.]

THE COAST LINE OF THE LONDON AND DOVER RAILWAY.

The energy displayed by the South-Eastern Railway Company in the formation of this portion of their line was acknowledged by the Cinque Ports Corporations in a banquet given by them to celebrate its completion. On that occasion, amongst the various mottos which decorated the apartments used for the festival, was the following—"The Homage of Dover to Energy and Talent;" and seldom has tribute of respect been more justly bestowed, for works of greater extent or more extraordinary character than those which the line exhibits have rarely been undertaken.

On leaving the vale of Folkstone, the railway crosses the Foord stream by a lofty viaduct of seventeen arches, and taking a northerly direction, enters, by the Folkstone tunnel, the flank of that magnificent range of chalk hills which extends from Portsmouth, through the southern counties, to the sea between the South Foreland and the town of Folkstone, where it forms a bold escarpment about twelve miles in length, and varying in height from two to six hundred feet. Along the first seven miles of this precipitous and lofty line the railway has been carried; and this has been done by tunnelling three of the larger headlands, blowing the smaller ones into the sea, carrying a sea-wall on the "unnumbered idle pebbles" which lie at the feet of others, and hewing immense cuttings through the slips and dislocations of the more chaotic masses; all of which have been accomplished with great apparent ease, though in the face of enormous and varied difficulties, by means of the irresistible power of scientific skill aided by ample capital.

The Folkstone tunnel is seven hundred and sixty-six yards in length, with an inclination of about one foot in two hundred and sixty-four—which is that of the rest of the line to Dover. For the most part the

chalk through which it is pierced is very 'shingly' in its character, wet, and a good deal mixed with a debris of blue clay and other argillaceous substances. The cutting of the tunnel was consequently a work of much difficulty, and there was a constant struggle with springs and noxious vapours. Nothing of any greater geological interest was found during this or the succeeding excavations than lumps of pyrites, sold by the labourers as 'potato stones' or 'diamond nutmegs,' and preserved by the peasants of the neighbourhood as mantel-piece ornaments or cabalistic wonders. The interior or 'bore' of the tunnel is now well bricked; it is ventilated by several draft-towers; and—what struck us as a very useful adaptation of a recent invention—the roof is drained throughout by sheets of fluted zinc, bent to the shape of the arch, each flute of the zinc acting as a gutter to carry off the drip. By this means passengers are effectually protected against wet, and the roadway of the tunnel is kept perfectly dry.

On leaving the tunnel, the line enters the great cutting known as 'the Warren,' a romantic undercliff of about two miles' length, running parallel with the sweep of East Wear Bay. Perhaps no more wonderful scene of wild natural beauty in connection with so imposing a display of industrial enterprise is to be seen in the world than the Warren presents, viewed from the summit of the Folkstone tunnel, a point which is reached by a precipitous sheep-walk from the 'No. 1. Martello,' north of the harbour. Beneath the eye, at the base of a line of cliffs five or six hundred feet in height, lies a belt of smaller cliffs, each one broken from its fellow, and occasionally tumbled one upon another in confused groups. Through this rocky wilderness the road is cut to a depth of about one hundred feet. The bottom is a firm dry rock; the sides are inclined at an angle of seventy degrees, and are "as smooth as a deal board." The colouring of the scene is of striking beauty. The chalk, stained by impregnations of iron, presents a blended picture of bright red and yellowish tints, alternating with whites, and relieved in their seasons by patches of mare's-tail (Equisetum palustre), thrift (Statice Armeria), the sea sunflower (Cistus Helianthemum), and some other marine plants of florid character. During the calms of summer, also, the serene silence which ordinarily rests upon a sea-side landscape seems to become more intense here by the contrast furnished in the abrupt passage of a train, which, as it pursues its rapid course, sends a thousand reverberating thunders through the adjacent hills, and then subsides to stillness more suddenly than even the lazy flight of the choughs and crows, which, for a moment scared from their nests, wheel a hasty circle in the midway air, and straightway drop to rest again.

After passing the Warren, the line enters the Abbot's Cliff Tunnel, a stupendous work one thousand eight hundred and fifty-seven yards in length, cut through chalk of so compact a structure as almost to rival limestone in hardness. This tunnel is nearly six hundred feet below the top of the cliffs, about twelve feet above high-water mark, and one hundred and fifty feet from the sea. It is partly bricked, and is well-drained, and ventilated by side galleries opening in the face of the cliff. Our engraving shows a view of it from the Warren. A zigzag walk at the back, through beds of samphire and wild cabbage, leads to the top of Abbot's Head, where splendid views of the coast of France, and of our own coast to Dungeness Point, are obtained.

On emerging from the tunnel, the sea-wall is reached. This is a structure of concrete, built on the spreading and partially submerged feet of the cliffs, which, from the tunnel-mouth to Shakspere's Cliff, have, with five or six exceptions, an inclination inland of some two hundred feet or more, forming an irregular bay. Across this rugged and unequal bottom a surface had to be cleared, and a superstructure reared sufficiently strong to resist the action of the waves, high enough to be beyond the reach of the spray, and at a point so far removed from the actual face of the cliff as to be beyond the reach of falling chalk, which, after wet and frosty seasons, sometimes slips from the superficial layers. In effecting these objects, obstacles of the most extraordinary and apparently insuperable character have been overcome. Several cliffs were found to project so much on the course of the line, and others were discovered to be so loose in their composition, that it became necessary to remove them altogether. This was accomplished in the case of the Round Down Cliff—a noble headland—and some others, by charges of gunpowder fired by galvanic action. Here, then, where billows roared, and the restless fuci scarcely found a point to fix their fibres upon, a road—a "pleasure line"—has been formed, as clear, as dry, and as safe as any old-established turnpike-road in the neighbourhood.

The sea-wall conducts the line for a mile to the southern face of Shakspere's Cliff, whose mighty mass, abutting in a huge promontory on the sea, seemed to forbid all farther progress in that direction. Its substance, too—such was the nature of its chalk—was found to be opposed to ordinary tunnelling operations: its texture was 'crumbly'—its mass was cut up by slips and fissures—and the whole mountain was devoid of those girders of flint which in ordinary cases bind the great chalk formations together. What, then, could be done? To have turned the position, by building a circuitous wall round it, was impossible; and to have destroyed this cliff by gunpowder would, from its poetic association, have been considered, at the present time, as a crime almost akin to sacrilege. In this difficulty the sailor's motto of "go through it" was adopted, and, in spite of all the difficulties and of the opinions of its impracticability, a tunnel was commenced, and after a while a tunnel was made—and a very beautiful one it is, and perhaps, likewise, the safest that has yet been constructed. This arises from its being a *double* one; for the peculiar impediments of the passage made it necessary to increase the ordinary size of the opening, and this again involved the need of a central support for the superincumbent weight. The complete tunnel is formed of two pointed parabolic arches, twice the usual height, soundly built of five or six layers of brick, and from end to end measuring 1417 yards. The ventilation, which is very perfect, is secured by seven shafts communicating with the top of the cliff, and by occasional arches in the central pier.

Leaving the tunnel, the line arrives at a loose shingly beach, on which the sea continually beats, and in rough weather with great violence. Here, however, the intrepid engineer, by adapting his resources to the peculiar exigencies of the case, has succeeded in erecting a safe and convenient road. A sea-wall would not in this instance have served the purpose: the sea would have washed it away. But where a solid structure would have failed, a light open timber-work framing, carrying the rails on an elevated platform, has been found to answer every requirement. A wooden viaduct, exposed to the fury of a south-wester, is in fact as safe as Waterloo Bridge.

The mighty obstacles of sea and land had now been conquered—the line had reached to the very threshold of Dover: but, before it could enter its venerable walls, an impediment of another description had to be overcome. At the end of the Dover viaduct, and concealing the town from view, stands a small rock, sur-

mounted by a fort, called, from its position, the Archcliff Fort. To carry the line into the town, this rock, not twenty feet in width, had to be tunnelled; but so great was the repugnance of the military authorities against having what was termed "one of the defences of the country" exposed even to apparent danger, that after the Company had surmounted every other difficulty, they were forbidden to take this the last step of their arduous journey. This difficulty was not removed without much trouble and delay, but at last, after many months of negotiation and dispute, the locomotive flag was planted on the chalk of the Archcliff, the *subterraine* was carried, the railway completed, and finally, on the sixth day of February last, the friends of the Company, with the writer of these notes, had the pleasure of celebrating their entire success, by riding through the fort-tunnel in the first train from London to Dover.

ON FIGURE-CASTING IN BRONZE.

A BRIEF account was given in No. 494 of the method of casting large statues in bronze or other metal, and of the numerous points of difficulty and delicacy involved in the process. We here give a few additional details connected more or less with the subject.

It is rather curious that a compound of two particular metals should have been found especially adapted to three purposes so opposite and disconnected as statues, bells, and guns. Yet such is the case. Bronze, bell-metal, and gun-metal are all alloys of copper and tin, consisting of different proportions of the two ingredients, but always comprising much more copper than tin. Brass and other metals are sometimes added instead of the tin; and there does not seem to have been any good reason assigned why one mixture should be better than another, the whole having been developed simply by a series of trials, and individual opinion being left to settle the point.

The early sculptors knew that by mixing tin with copper a metal is procured more fusible and much harder than copper alone; and they seem to have been led thereby to the employment of this mixed metal in casting statues. Indeed various articles, such as spears, daggers, belt-ornaments, axes, hammers, chisels, &c. found among ruins, testify that bronze was also employed in the fabrication of them. After the time of Alexander, the employment of bronze for statues became almost a passion, insomuch that the Greek and Roman towns became crowded with statues of great men. The island of Rhodes is said at one time to have contained nearly a hundred colossal statues in bronze. All those among the early writers who record the victories of the Romans over the Greeks after the time of Alexander, speak of the immense number of statues brought away by the conquerors; and it seems probable that this spoliation was the source of a taste for such works of arts among the Romans. Augustus published an edict, to the effect that the statues erected during his reign to great men should remain, as an example to kings. It was from the time of this emperor to that of Nero that the art flourished most at Rome; after which it decayed slowly till the time of the irruption of the barbarians, when a stop was necessarily put to this as well as all other branches of the fine arts. The revival of the arts in Italy in later times, and especially the labours of Benvenuto Cellini, tended to raise the art of figure-casting again into importance; and it has ever since been carried on in the principal countries of Europe.

Among the follies of the French Revolution was that of destroying all or most of the bronze statues which France contained; but when the people returned to their senses many of these were re-erected, and new ones cast. It was an idea consistent with the notions of military glory entertained at that period, to cast honorary statues and columns with metal derived from guns taken in battle; the victory being thus commemorated doubly, both by the object itself and by the metal of which it was made. Some of the incidents attending these bronze foundings are curious, and well illustrate the niceties attending the art. We shall condense a few particulars from a French scientific work published a few years ago.

One of the bronze statues cast by order of the French government was in honour of General Desaix. The execution was adjudged to the person who sent in the lowest estimate; and this person was a speculator who undertook to execute a colossal statue for a hundred thousand francs, exclusive of the bronze. He employed a bell-founder, who, not understanding the execution of so large a work, and calculating agreeably to the operations on the small scale to which he was accustomed, bound himself under forfeit to complete it for twenty thousand francs, stipulating at the same time that the sculptor should *not* be allowed to superintend the casting from the model, since this superintendence would (he probably thought) interfere with his profitable execution of the job. The model was formed by the sculptor, and placed in the hands of the bell-founder, who proceeded to fill up the hollow parts, to facilitate the process of casting; his framework, his furnaces, and all parts of the apparatus were in like manner formed in the cheapest and most inefficient manner, in accordance with the ideas of one who utterly misunderstood the nature of what he had to do. When the metal in the furnace was melted, the framework of the furnace tumbled to pieces, and the metal ran into the pit in such a way as to spoil the operation. Much metal was lost, and the founder had to begin again. He thought he should manage better if he were to cut the model to pieces, and make the cast in many distinct parts. He did so; but he used bronze of different qualities in the different castings, and these, by shrinking unequally, produced a whole in which all the proportions of the figure were changed, and a wretched failure resulted. Such was the result of employing the "lowest bidder" without sufficient guarantees.

Another instance was that of the casting of the column in the Place Vendôme. A bargain was made with an iron-founder, who, though he had never before undertaken any work in bronze, agreed to mould and finish the column for one franc per kilogramme (rather more than four pence per pound); the government engaging on its part to supply a sufficient quantity of bronze from the cannon taken in the Austrian campaign of 1805.

A celebrated chemist of that day advised both the government and the founder to cause an analysis to be made of the composition of the different pieces of ordnance, in order that an alloy might be made uniformly similar in every part of the column; but the advice was neglected on both sides. It was also suggested that a few preparatory trials would be expedient, to determine the best alloy, the best kind of loam for the casting, and the best modes of operating; but the iron-founder appears to have set to work without attending to the suggestion.

A furnace similar to an iron-furnace was employed, and the bronze was melted in it; but from ignorance of the difference between the methods required for casting in iron and in bronze, the founder failed in the casting of many of the earlier pieces, and in re-casting them his metal suffered change, and the different pieces were not alike in quantity. So much

waste occurred in various ways, that when two-thirds of the column were cast he found that all his metal was gone. Here was at once a sad perplexity; for the government had delivered to him the quantity of metal agreed on, and expected a complete column to be made from that quantity. In this dilemma he used up the *scoriæ* from the furnace, mixed with old brass and copper purchased at a cheap rate; but the pieces cast from this "forlorn hope" of the furnace were so full of holes and so badly coloured, that the government refused to take them: the founder was full of trouble, and the government stopped his proceedings by putting a seal on his foundry. Subsequently a commission was appointed to examine the state of the accounts between the government and the founder. They found that a loss of ten per cent. as waste had been allowed to him, and that he had actually sold a little of the metal under the impression that the waste would be much less than this. Upon analyzing the pieces sent in, they found that about nine-tenths consisted of copper, three-fourths of the remainder were tin, and a very minute quantity of lead, zinc, iron, and silver made up the other ingredients. These proportions, however, were not equal in all parts, for the pieces first cast were richer in copper than the standard required by the government, while the last pieces were of poorer quality. The pieces, too, were so badly cast, that many tons of metal were chipped away in dressing them before fixing them in their places. By a sort of fatality which seemed to attend all the arrangements, the pieces were fixed up without due regard to the expansion resulting from the sun's heat; and much trouble was subsequently occasioned by this circumstance.

One more example will tend to show the difficulties attendant on bronze-casting. After the fall of Napoleon, a bronze statue of Henri IV. was ordered to be cast by the French government, the materials for which were to be derived from several sources, viz., a statue of Napoleon which had been intended for the Boulogne monument, the bassi-relievi of the same monument, the statue of Desaix, and the statue of Napoleon which had till then surmounted the column in the Place de Vendôme.* These were to be all melted together and cast into an equestrian statue of Henri Quatre, to be placed on the Pont-Neuf. As an error had been before committed by allowing a common founder to cast statues, it was resolved on the present occasion that the sculptor alone should have the management of the casting. This, however, was an error on the other side; for the sculptor was not acquainted with the temperatures at which different alloys of metal melt. He employed for melting the statues the same furnace which had before been employed for melting cannon; but the melting-point is different, and the same draught of furnace which was available for the one kind of metal would not do for the other. Much difficulty was experienced from this want of foresight, and the statue was not finished without many disappointments to all parties concerned.

Any one who has seen the ancient bronzes, such as those at the British Museum, must have observed a delicate greenish bloom or down on the surfaces. This is called by the French *verds antique*; and many attempts have been made to imitate it. But as this peculiar tint is probably the result of the action of the atmosphere on the metal during a long series of years, the artificial production of a similar appearance on new metal can be no more than partially successful. There is likewise a kind of rich and somewhat golden hue on the projecting parts of old bronzes, where they have been rubbed, and to imitate this is also one of the aims of modern art. A dry substance called gold powder or gold bronze (aurum musivum) is lightly applied to a surface previously coloured of a greenish tint, and a somewhat showy imitation is thus produced, which, when applied to plaster figures, has but little resemblance to the calm and sombre hue of the ancient bronzes.

A remark may be made in conclusion respecting a suggestion made a few years ago for the establishment of National Collections of Casts in England. Mr. Wilson communicated to the Scottish Society of Arts, about six years ago, a paper on the nature and extent of the encouragement which an enlightened government should afford to the fine arts. After alluding to the advantages which artists derive from the study of ancient sculptures in Italy, and to the classical taste which such study engenders, Mr. Wilson draws attention to the desirability of government procuring casts of all the celebrated statues and busts from various quarters, and establishing collections of them in various parts of the country. He says, "The collection of sculptures in the British Museum has been a prodigious benefit to art, but this benefit is almost entirely confined to London: few students from the provinces can afford to visit the metropolis; and, as a means of generally diffusing taste throughout the country, museums in London are of little avail. Provincial galleries must be opened: meritorious efforts are making in this way, but the difficulty of procuring casts sadly impedes these efforts." These views are supported by an opinion which Dr. Waagen expressed before the Committee on the Arts of Design—"The best way of forming the taste of the people is by the establishment of accessible collections of the most remarkable monuments of antiquity and of the middle ages. In the capital of the country there should be the chief collection; but it is injurious when all is centralized and confined within the capital; it is also useful, as is partly the case in France, and intended to be in Prussia, to establish subordinate collections in the principal towns in the country. The principle on which such collections should be formed is, that the monuments of the best period, both of ancient and modern art, which are too expensive and too costly to be possessed by private amateurs, should more especially be placed in a public collection. Collections can only propagate taste and art in a nation, when every man can daily and hourly find free access to the collections of art."

The Scottish Society of Arts passed a series of resolutions fully approving the principles involved in Mr. Wilson's suggestions.

* A new statue of Napoleon was put up by Louis Philippe on the Vendome column in 1833.

Supply of Air to the Roots of Plants.—The breaking up of the surface of cultivated land, either by the plough, spade, or hoe, for the reception of seeds or plants, is a process so universally practised and indispensable for the well-being of the crops intended to be raised thereon, that it may be deemed incredible that so common and simple an affair should not be universally understood. The surface of the earth is one of the sources whence plants obtain the elemental food requisite for their development, and certain conditions of this surface are absolutely necessary. Humidity, heat, and air, in due proportions, are indispensable both to the fibrous roots which are extended in the earth, and to the head of the plant expanded in the air. There is more danger, however, from the excess of moisture than from the extremes of either heat or air; because, when the soil is saturated with water, the access of the general air and its gaseous properties is excluded, and the delicate fibres, imprisoned and choked, it may be said, for want of breath, must in such cases necessarily languish.—*Journal of Agriculture.*



[1, Sambucaria; 2, Lunaria; 3, Vinaria; 4, Papilionaria, 5, Syringaria, 6, Amataria; 7, Defoliaria.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

British Moths—*continued.*

The group of moths at the head of this article all belong to the family Geometridæ, or the geometric group of Stephens, the term applying to the caterpillars, and not the perfect insects.

1. The Swallow-tail moth (Ourapteryx Sambucaria), perfect insect, caterpillar, and pupa.

The genus Ourapteryx was established by Dr. Leach, and contains only one European and six exotic species. The most remarkable character, and which at once distinguishes this form, consists in the form of the posterior wings, which terminate each in an elongated tail-like process, as in several diurnal butterflies.

The Swallow-tail moth is spread over the whole of Europe, and is not uncommon in woods and gardens in our island: it is frequent about Paris.

The flight of this moth is extremely rapid, as might be inferred from the extent and form of its wings, but it is seldom or never seen abroad by day, the hours of evening, dusk, and those just preceding the dawn of day being its times of activity.

The caterpillar is a strange-looking creature of an elongated form; it is in the habit of adhering to the stem of a tree or bush by means of its posterior claspers, while it extends itself at a considerable angle from its support, appearing at first sight like a broken twig. It is of a cinnamon brown colour, furrowed longitudinally, and presenting three tubercles, two placed laterally on the sixth ring, and the other on the ninth. It lives principally on fruit-trees: it is said to feed on the leaves of the Elder, whence the name Sambucaria, but there is reason for doubting the truth of this fact.

The pupa is remarkable for suspending itself from a branch by means of several delicate filaments of silk, to which a frail cocoon is attached, consisting of loose silk, among which bits of dry leaves are thickly interwoven, so that it resembles a loose packet of withered foliage. The pupa is presented thus suspended in its cocoon in the accompanying group of pictorial specimens. The moth comes forth at the end of June or the beginning of July; its colouring is as follows:—the four wings are of a pale yellow above, powdered with greenish grey, and with three transverse streaks of dusky yellow. The two first streaks are nearly straight, and in the interval between them is a little dusky crescentic mark; the third streak is somewhat flexuous. At the base of the posterior angle of the under wings are two black spots, of which the outermost is ocel-

lated with a rufous pupil. The fringe of the upper wings is rufous. Expansion of wings from two inches to three and a half.

2. The Lunar Thorn moth (Geometra lunaria), perfect insect, caterpillar, and pupa.

This species not only varies greatly in size, but in colouring, the general tint being sometimes of a pale ochre-yellow, more or less varied and sprinkled with rufous, sometimes of a lively orange, and sometimes of a beautiful rose-red. Generally each wing is marked in the centre with a little white transparent crescent; and sometimes the crescent exists only on the upper wings, sometimes on the under wings. This circumstance, joined with other differences, has induced many to consider the varieties of this moth as distinct species, but it is proved, by rearing the caterpillars till the perfect moth appears, that, vary as the latter may, they are all referable to the same species. The following characters are common to all. The upper wings have at their tip a rufous brown semilunar mark, and are transversely barred in the middle by a streak of the same colour, bordered on each side by two brown lines, and traversed itself by a darker line, on which is placed the white crescent already mentioned. The hinder wings are generally traversed by similar markings.

The caterpillar varies greatly in its colour, and often assumes that of the young shoots of the tree or bush on which it lives. It is mostly of a greenish grey mixed with brown and yellowish, with a ferruginous mark extending itself over the two first rings; a tubercle on the eighth ring is of this colour, and the head is brown. It feeds on the thorn, elm, oak, willow, &c. The pupa is slender.

Two broods of these moths appear annually; the first in June, the second in August and September. In England the Lunar Thorn moth is by no means a common species; it occurs, however, in some of the woods near London, as Combe and Darent woods, and has been taken near Warwick and other places. It is said to be common on the elms on the Boulevards of Paris

3. The Common V-moth (Grammatophora Vaparia), perfect insect, caterpillar, and pupa.

This moth is very common in gardens around London, and in most other parts of England, where the caterpillar commits extensive ravages on gooseberry-bushes, stripping them of their leaves, on which it feeds. During some years it swarms in hosts, which prove very destructive. The colour of the moth is subject to variety; in general the wings are of an ashy grey, powdered with a darker tint, and mottled with four black spots on the anterior edge, whence a faint slender line extends from the second to a mark like the letter V. On the outer edge the wings have a dusky wash. In some varieties the wings are white, marbled with cinereous; in others they are of a sooty black. The caterpillar is greenish, spotted with black, and with a dorsal line of yellow, and lateral lines of the same colour. The pupa is brown.

4. The large Emerald moth (Hipparchus Papilionarius), perfect insect, caterpillar, and pupa.

This species is remarkable among the geometric moths from its great size, its beautiful green colour, and the elegant contour of its wings, which resemble those of a diurnal butterfly. Like the butterfly it raises up its wings during repose, and it is from this circumstance that Linnæus gave it the title of *papilionaria*. It is not a common insect in our island; in some districts, however, it is occasionally seen in numbers, and Mr. Stephens says that once, in a lane near Birchwood in Kent, he saw some dozens of the wings, several in fine condition, strewed about under an old oak. These wings were doubtless the relics of individuals which had fallen a prey to bats; in fact, the bat is noted by entomologists for the havoc it makes among such moths as frequent trees and woods, and it always rejects the wings, which are often found in great numbers at the roots of trees on which the animal has settled with his prey.

The Emerald moth has the wings of a fine grass green, the anterior pair having two or three interrupted transverse marks of grey,—the posterior wings generally two such stripes. The antennæ are reddish white. The caterpillar is sluggish in its movements, and feeds on the leaves of various trees, as the lime, birch, alder, hazel, &c.; it is of a green colour, with a yellowish lateral line and red tubercles on the back. The pupa is elongated, and of a reddish brown colour. The perfect insect appears about the middle of July. M. Duponchel says that there are two broods, the first in May and June, the second in July. He adds, that in France it is not rare in the damp parts of forests where the beech is abundant, the second brood being the most numerous. But in order to see a large flight of these moths, one must take advantage of a very tranquil time and wait till the sun is set. He has, he says, taken a dozen within half an hour in the forest of Mprmal.

5. The Lilac Beauty (Pericallia syringaria), perfect insect, caterpillar, and pupa.

The Lilac Beauty is by no means a common species in our island, but has been captured in various places: it is far more abundant in France, and may be found in the gardens about Paris. The anterior wings are varied with yellowish and grey, and tinted with purple or purplish rose-colour; on the anterior edge are some purplish white dashes, and a little before the middle is an angular violaceous stripe, with two others behind common to both the wings; of these the first stripe is brown, the second brown and violet, with some black spots on the posterior wings, towards the inner margin. Towards the apex of the anterior wings is a violaceous lunular spot. The posterior wings are of a greyer tint. The female exceeds the male in size, and is of a paler colour.

The caterpillar of this elegant species is remarkable from the oddity of its form and its attitude during repose. Instead of keeping its body straight and stiff, as is the case generally with those of the geometric group of moths, it folds itself into a curved line, with the head a little raised up. Its colour is generally brownish red, with a black dorsal band extending over the four first rings. Its form is thick, and a long slender horn is carried on the seventh ring. Besides this horn, there are two little conical tubercles on each of the fifth and sixth rings, and on the sixth and seventh two little white excrescences.

It feeds on the lilac, the jasmine, and privet; and hence the moth frequents gardens, and parks, and pleasure-grounds, rather than woods or fields.

The pupa is not less remarkable than the caterpillar: it is of a short figure, and is almost rounded anteriorly, broad in the middle, and terminates abruptly in a point. It is of a dull yellow tint, with the upper parts chestnut. It is always found fixed perpendicularly, the head upwards, to a young twig, and is retained in its position by a number of threads, which are united together at its apex.

6. The Blood-veined moth (Bradyepetes amataria), perfect insect, caterpillar, and pupa.

The genus, founded by Mr. Stevens for this species, is characterized by the very acute anterior angle of the wings, and the angulated hinder margin of the posterior wings, combined with the oblique stripes which pass through their disc, from the apex of the anterior wings to the inner edge of the posterior. The Blood-veined moth is rather local in its distribution in our

island, being extremely abundant in some places and rare in others. It is common in France, and frequents the Bois de Boulogne. Its flight is sluggish. The wings are of a pale yellowish grey finely powdered with brown, with a very oblique purple-red or sanguineous streak crossing both wings from the apex of the anterior to the middle of the inner edge of the second pair. At the base of the anterior wings is a pale brown transverse stripe, and a dusky stripe at the posterior margin of both wings winds flexuous from the apex of the fore wings. The edges are fringed with red, and in fine specimens the hinder margin of all the wings is beautifully suffused with a rich sanguineous purple.

The caterpillar is very singular; it is cylindrical, but little elongated, with the fourth, the fifth, and the sixth rings much thicker than the others; the head is small, and buried under the first ring. The ground-colour is umber, with several yellow streaks, one of which is dorsal and longitudinal, interrupted by black, and crossed by other lines forming lozenge-shaped marks on the intermediate rings, and bordered with black. It lives on various trees and shrubs, as the hazel, whitethorn, &c.

The chrysalis is also very curious: it is of a slender form, with a notch at the head. It is generally found enveloped in a slight network or thin tissue between leaves. The perfect insect appears in July.

7. The Mottled Umber moth (Hibernia defoliaria), perfect insect, winged male and wingless female, caterpillar and pupa.

In the genus Hibernia the anterior wings are long and thin in the male; in the female the wings are either wanting or very rudimentary. The species are all autumnal, beginning to appear as perfect insects at the fall of the leaf.

The Mottled Umber moth is common all over Europe. In our island it abounds around the metropolis, frequenting gardens, orchards, woods, and copses. It is subject to considerable variety. In general the upper wings are of a pale ochre-yellow, powdered with brown, with two transverse bands of yellow-brown mingled with ferruginous, one near the base, the other between the centre and the outer margin, and is bordered internally with black, and externally by dashes of brown. There is a black spot in the interval between these two bands. The fringe is yellow, varied with deep brown. The lower wings are of a pale yellow, finely freckled with reddish grey, and with a black central dot.

Sometimes the wings are ferruginous or griseous throughout, with darker strigæ; sometimes these are obsolete. In fact scarcely two specimens ever occur alike. The female is wingless, yellow, and dotted with black. The caterpillars swarm during some years, and become extremely destructive in orchards, stripping the fruit-trees of their leaves; this is particularly the case in France, where they have occasionally committed great havoc.

The ground-colour of the caterpillar is ferruginous, with a bright interrupted yellow streak on each side, and a red spot with a white dot on each segment. The attitude which it assumes in a state of repose is remarkable: fixed by its hind feet, it bends the middle of its body into the form of an arch, raising up its head and the three first rings, of which the feet are at that time widely separated from each other.

The females of this moth—being unable to fly, from the absence of wings—remain fixed on the twigs or branches of the tree, the pupa having there undergone its change; and they deposit their eggs on the leaves in countless numbers, whence, in the spring, issue destructive hordes, of the effects of which the leaves of our pear-trees at this moment present mournful evidence.

As the moths described in this paper belong to the family Geometridæ of Stephens, so called from the figures and actions of the caterpillars, we may conclude by a few observations on these latter creatures, which, in many of their ways, are very curious.

With various naturalists it is a favourite theory that the forms and colours of living beings are rendered subservient to their concealment from enemies, the latter blending and assimilating with those of surrounding objects; the former deceiving the eye by approximating in outline to that of twigs, sticks, leaves, and the like, on or amidst which they habitually dwell. How far this theory will bear rigid investigation we shall not here discuss. Abundant instances may be offered to the contrary, and numerous examples may be adduced showing that in their case at least there is some ground for the assertion.

We have alluded to the stick-like appearance of the caterpillar of the Swallow-tail moth, and we may here add that that of the Lunar Thorn moth exhibits much the same aspect. With respect to the former, resting on its prolegs with the body stretched out stiff and immoveable at an angle with the branch, its only support being a slender thread of silk, from which the head hangs in order that it may be ready, in case of attack, to lower itself in safety to the ground, it so closely resembles a fork of the branch, that Rösel's gardener mistook one for a dead twig, and, on laying hold of it in order to break it off, started back in the utmost alarm when he found it to be a living animal. These caterpillars feed chiefly in the night, resting during the day in this stiff, and, as we should think, most fatiguing attitude, without the slightest movement. Yet we are induced to ask whether a bird or an ichneumon fly would mistake this insect as did Rösel's gardener? Mr. Rennie has said that no naturalist would have fallen into such an error. This means nothing, inasmuch as a naturalist is one who has amassed the knowledge of a number of facts from observation, and has habituated himself to seize at a glance upon minor peculiarities, not regarded by others, because they are either not aware of their existence or of their importance as diagnostics. The question is not whether a naturalist would detect the caterpillar in the stick-like projection, but whether general observers, the ordinary passers-by, would not overlook it. We think that they would.

It is not, however, from this singular habit of remaining motionless in one fixed attitude that these caterpillars are called geometrical; it is from their assuming in progression the form of a pair of callipers, or rather that of the Greek Ω (Omega). At the commencement of their movements, they form an arch, bringing the anterior and posterior segments of the body, on which are seated the true limbs and the prolegs, closely together. To take the first step, they stretch out the head to the full extent of the body, secure themselves firmly, and then bring up the rear, assuming the Ω form again. Among their popular names from this mode of progression are those of loopers and surveyors: they march along, measuring the branch or spot over which they crawl by their body's length. As another example of these geometric caterpillars, we may mention those of the Brimstone moth, far more common than the caterpillars of the Swallow-tail, and to be collected in the hedge-rows of hawthorn during the latter part of summer. With their withered wrinkled skin, furrowed like bark, their bulging rings, and the notched excrescence on the back, they look like self-moving bits of dry dusty sticks.

DRAWING-CRAYONS.

The kind of drawing-pencils called *crayons* are made of a white or coloured earthy composition, of such a consistency as to trace a mark on the drawing paper or board used. This seems to have been a foreign invention. The name itself is probably derived from the French word for chalk, *craie*; and the crayon possesses marking properties very similar to those of chalk. *Pastel* is another name for *crayon*. We will condense from the 'Dictionnaire Technologique,' and other sources, a few details concerning the manufacture of these useful adjuncts to the drawing-table.

As the crayon is the result of the mixture of some colour with an earthy base, and as it is necessary that the line or mark in a drawing should be formed readily and equably, the earthy base requires to be brought to a very fine state of subdivision before being made into a paste. After the grinding, therefore, the earthy substance is levigated, or washed in water, and allowed to deposit a sediment by being left undisturbed for some time. The usual base or earthy matter of the crayons is either washed chalk or tobacco-pipe clay; occasionally calcined gypsum and starch-flour are employed; and on other occasions the ochres and red lead. Besides the earthy base and the colouring substance, there must be some kind of mucilage or liquid to form these into a paste; and the choice of this liquid is an important point in the arrangements. The gummy nature of this agent must be such as will hold the crayon together in a solid form, and yet allow it to disintegrate or 'mark' in the process of drawing. Gum Arabic and gum tragacanth are the chief kinds of mucilage employed: and these are made more or less limpid according to the sort of crayons to be formed, by varying the quantity of water added to the gum. When the crayon is of a kind to require only a slight degree of agglutination in the paste, a little sugar is added to the gum, in order to lessen the degree of hardness in the drying; or a little soap-lees is added to produce the same effect. For other varieties of crayon, oil, wax, or suet is added to the paste; but such kinds are only used for prepared canvas, the surface of which is slightly powdered over before the crayon is applied. Generally speaking, however, chalk and gum tragacanth are the two main ingredients, besides the colouring substance required for coloured crayons.

There is first prepared a primitive paste for crayons of all colours indifferently, and then coloured pastes to add to this in such proportions as will give the desired tint. The chalk or pipe-clay is ground up with gum-water to the requisite consistency, and this serves as a basis for crayons both white and coloured. Each colour is also ground up into a paste: and according to the quantity of the latter mixed with the former a coloured paste will be produced of deeper or lighter tint. By making the different kinds of paste separately, and mixing them in duplicate and other proportions, shades of colour may be produced which will bear a sort of numerical relation one to another.

When the proper tints of colour have been produced, the paste is worked up into the oblong cylindrical form which crayons present. The paste is first dried a little between two sheets of unsized paper; and when the excess of humidity is thus absorbed, and the paste can be handled without adhering to the fingers, it is divided into small masses. These masses are formed into balls between the palms of the hands, and then rolled to and fro by the hand on a flat smooth wood [illegible] wooden planks. There are two small parallel [illegible] are cut [illegible] fixed to this plank, of such thickness as [illegible] These wings [illegible] the diameter of the cylinders into which the paste is rolled; and when the diameter is approaching nearly to this limit, a flat piece of wood is substituted for the hand, with which the process of rolling is brought to a conclusion. The cylinders thus formed are then cut with a knife into lengths of about two inches each (the usual length of crayons); and when dry they are pointed at one or both ends with a knife.

If the paste during the progress of rolling is pressed and worked so as to expel all the little bubbles of air which may have been mixed up with it, the crayon when finished will break with a homogeneous and close fracture; but if this be not the case, the crayon will be fragile and full of holes. Sometimes, in order to procure the crayons in a solid and dense form, the paste is strongly compressed between two channels which exactly correspond, and which thus give form and dimension to the crayon. A third method consists in forming a kind of hollow tube of tinfoil, by rolling it round a steel mandril or rod, and then filling this tube with paste rather more liquid than that used in the former method, the tinfoil being removed when the crayon has become dry and solid.

Various substances are employed to impart colour to the crayon-paste. Yellow ochre, mineral yellow, Naples yellow, chrome, and other pigments of a similar kind, are employed for yellow crayons; red chalk, vermilion, madder, and Brazil wood are among the colouring ingredients for red; smalt, indigo, and Prussian blue, for blue; Brunswick green, or various mixtures of blue and yellow, for green; umber, or a mixture of red and black, for brown; charcoal and lamp-black for black: indeed, the usual substances employed to give colour to most paints and pigments are also employed for crayons.

It is obvious that every part of the process of making is capable of much modification, and that the choice of ingredients is equally open to variety. The above description, therefore, will not apply to all cases with equal strictness, but will serve to explain the general nature of this kind of manufacture.

Rapid Growth of Plants.—Who can understand or explain the extraordinary activity which pervades the entire vascular system of the plant when circumstances are favourable to its growth? A stalk of wheat has been observed to shoot up three inches in as many days, of barley six inches in the same time, and a vine twig two feet, or eight inches a day. (Dr. Hume.) Cucumbers have been known to acquire a length of twenty-four inches in six days, and in the Botanic Gardens at Brussels I was shown a bamboo, five inches in diameter, which had increased in height nine feet in twenty-seven days, sometimes making a progress of six or eight inches in a day. In our climate we meet with few illustrations of the rapidity with which plants are capable of springing up in the most favourable circumstances, and the above examples probably give us only an imperfect idea of the velocity with which the bamboo, the palm, the tree-fern, and other vascular plants may grow in their native soil and climate. And with what numerous and complicated chemical changes is the production of every grain of the substance of these plants attended—how rapidly must the food be selected and absorbed from the air and from the soil—how quickly transformed and assimilated. The long period of time during which, year after year, these changes may proceed in the same living vessels, or in the same tree, is no less wonderful. Oaks have lived to an age of 1500 to 2000 years, yew-trees to 3000 years, and other species are mentioned as having flourished from 4500 to 6000 years; while even a rose-tree (*rosa rowgnai*) now living is quoted by Sprengel as being already upwards of 1000 years old. The rapidity of the growth of a plant, and the length of its life, are equally affected by circumstances. On a knowledge of these circumstances, and of the means of controlling or of producing them, the enlightened practice of agriculture is almost entirely dependent.—*Johnston's Agricultural Chemistry.*



[Church of the Invalides.]

HOTEL DES INVALIDES, PARIS.

The geographical position of France renders the organization of its military power one of the most important objects of its domestic policy. After a peace of thirty years, the budget of the minister of war swallows up nearly one-fourth of the national taxes, and the standing army withdraws above three hundred thousand men from productive industry; besides which there are nearly six million persons enrolled as liable to serve among the national guards. Before the stranger has been long in Paris, he will have discovered that the military spirit is one of the most striking characteristics of the French people. It predominates over every other form of life in the picturesque capital of France. The population may be said to rise to the sound of the *reveille* as in a great camp, and the drums beat the evening "tattoo" in every part of the city. At night, as the solitary passenger proceeds to his home, he meets patrols of the municipal guard, or is perhaps challenged by sentinels on duty at the different posts. The numerous guard-houses correspond to the "stations" of the London police. A review of the national guards and garrison of Paris on the Boulevards exhibits on a magnificent scale the pomp and circumstance of military display. These gay and beautiful thoroughfares are admirably adapted for such a purpose. Battalion after battalion marches past accompanied by its band, and if the spectator is placed so as to command a view of the advancing host as they come in procession apparently interminable, their arms glittering in the rays of a sun of unclouded splendour, he will acknowledge that few spectacles can be finer. Added to the scene itself are the historical recollections which belong to the capital of France, and the brilliant military renown which the French arms have acquired. But these are chiefly the commercial classes, the shopkeepers and artisans of Paris, who are moving past him with so martial an appearance, and it is impossible not to feel that the military genius of the French is a great power in the world for good or evil, and that the course of European history cannot but be modified by its influence. The garrison of Paris is usually composed of about thirty thousand men, and sometimes even of forty thousand, who are lodged in thirty-five barracks in different parts of the capital.* The Paris national guard consists of twelve legions of infantry, of four battalions each, and there is a legion of cavalry of several squadrons. The number of armed citizens is about fifty thousand. The municipal guards, though under the direction of the prefect of police, are a military force, and comprise about fifteen hundred infantry and cavalry, remarkable for their soldier-like appearance. Even the firemen, between six and seven hundred in number, wear a military uniform. Here then we have above eighty thousand soldiers and citizen-soldiers in a population less than one-half the population of London. If the organization of London resembled that of Paris, instead of a few hundreds of the Guards and between three and four thousand policemen, we should have a garrison of sixty thousand troops of the line distributed in seventy barracks situated in every part of the metropolis; and a hundred thousand merchants, shopkeepers, clerks, and respectable artisans who could be assembled on grand occasions in military uniform, and of whom a certain number would be always on duty, mounting guard along with the household troops, while drilling, marching, reviewing, and other exercises which are requisite in gaining precision in military duties, would be continually going on. Every one will see that the existence of such a system in London would be intolerable under any other circumstances short of some dire national calamity. The deductions from the time of the citizen and the interference with his pursuits, which are involved in the

organization of a national guard, are, we suppose, cheerfully submitted to in Paris; and the impossibility of fancying such a state of things in London indicates very fully the differences, both social and mental, which prevail in the two capitals. We lose, it is true, the splendour of military spectacles: at a "grand review" for the gratification of a great northern prince who recently visited this country, there were, as it was remarked, about as many troops assembled as daily mount guard at his palace; but these displays may be very cheerfully dispensed with when they can only exist in connection with the predominance of the sword, and the intrusion of the camp and its spirit, upon domestic life.

Our object at present, however, is to give some account of the Hôtel des Invalides, the military hospital of France. An old soldier re-enters society under disadvantages so great as almost to preclude him from filling his part with success. He has been so long accustomed to form a part of a machine that he is disqualified for independent action, and he loses himself for want of guidance. He makes a bad colonist, generally speaking, and too often a bad member of society. Retired Uncle Tobys are not sufficient in number to afford an asylum for the more numerous Corporal Trims who require a resting-place in old age, and both policy and humanity dictate the necessity of establishing public institutions for the reception of the old veterans. In the sixteenth century the old and disabled soldiers in France had no other resource but the charity of the monasteries of royal foundation. In 1596 Henry IV. converted a convent in one of the faubourgs of Paris into an hospital for military invalids, but the institution, which was removed to another situation by Louis XIII., remained on a small scale for nearly a century. The long wars of Louis XIV. rendered it necessary to make provision for a larger number of old soldiers, and in 1670 the foundation of the Invalides was laid, the king reserving to himself the honour of being its sole benefactor by prohibiting legacies being left for its support. The main building, including the first church, was completed in 1706. Chelsea Hospital was begun a few years later, in 1682, and was completed some years earlier. The second church or dome of the Invalides, a view of which is given in the cut, was also completed in 1706, and was intended for the celebration of military rejoicings and festivals. Additions have been made from time to time to the buildings, which now cover an area of sixteen acres. The Hôtel des Invalides is almost the only public building in Paris which has always been retained for its original uses. The first Revolution changed only its name, and the Hôtel became the Temple of Humanity, while under the Empire it was called the Temple of Mars: but at the Restoration the old name again came officially into use.

The Hôtel des Invalides is situated on the right bank of the Seine, on the south side of Paris. It is approached by an esplanade, which extends from the quay on the Seine, and measures 1440 feet by 780. The fountain in the centre of the esplanade was formerly ornamented with the bronze lion taken from St. Mark's at Venice, which was restored at the peace of 1815, and is now replaced by a statue of Lafayette. On the north front there is a wide terrace laid out as a garden and bounded by a fosse. On the south front of the dome church there is a small green esplanade, beyond which are avenues of trees branching in various directions. The front of the Hôtel is 612 feet in length, and presents three projecting masses. The central part is decorated with fluted pilasters, which support an arch ornamented with military trophies, in which is a bas-relief of Louis XIV. on horseback. The windows of this front are formed of a cuirass surmounted by a helmet and surrounded by a mantle, a circular window being pierced in the middle of each cuirass. The architectural decorations throughout are of a military character wherever they could with propriety be made so. The gateway in the centre leads to the Cour Royale, which is 312 feet by 192. This quadrangle consists of four piles of buildings with central projections, and pavilions at the angles. There are besides other courts; but a minute detail of the plan and of the architectural designs would scarcely be intelligible if only briefly given. The first church, called l'Église ancienne, is 66 feet high, 210 feet long by 40 in its least and 72 feet in its greatest breadth, and consists of a single nave, with low side aisles supporting a gallery. The flags taken by the French from the enemy are deposited in this church. They are chiefly Spanish and Portuguese, with some from Algiers, and there are two or three English standards. During the empire the nave of this church was hung with nearly three thousand flags of every nation on the continent. They were destroyed the evening before the allied troops entered Paris in 1814. The second or dome church is a square edifice, 138 feet long, at the southern extremity of the first church. It is united to the old church by the arch in which the great altar stands. In the centre of each front is a projecting mass crowned by a pediment. The principal entrance is by the portico on the south side, which is composed of two ranks of columns, the lower ones of the Doric and the upper ones of the Corinthian order. The circular tower, which rises from the body of the church, is surmounted by forty columns of the Composite order, arranged in pairs. An attic, adorned with circular-headed windows, springs from the tower, and from this rises the dome, the curve of which is considered as peculiarly elegant. Its external diameter is 80 feet, which is within 32 feet of the diameter of St Paul's. The spaces between the twelve ribs by which the dome is divided are decorated with projecting devices of military trophies, arms, &c., and, with the ribs themselves, are gilt. The dome is surmounted by a lantern, which is crowned by a spire, globe, and cross, all richly gilt. The total height from the ground to the summit of the cross is 323 feet. The pavement of the dome church is of white marble inlaid with lilies and ciphers, and the cordon of the order of the Holy Ghost. The ceiling is painted, and there are pictures in the different chapels. In a vault beneath the dome are interred the remains of Marshal Mortier and the other victims (one of whom was a young girl) of the attempt of Fieschi on the life of King Louis Philippe, on the 28th of July, 1835.

The government of this great establishment is under the immediate superintendence of the Minister of War. The governor is always a marshal of France, and he is assisted by about one hundred and twenty officers. His salary is 35,000 francs a year, or about 1400*l.* (25 francs to the pound). The general-commandant is paid 12,000 francs, the intendant 10,000 francs, and the colonel-major 6000 francs. All soldiers disabled by wounds, or who have served thirty years, are entitled to the privileges of the institution, which includes board, lodging, washing, and clothing. The Hôtel is capable of accommodating 7000 persons, but the number of inmates at present is only about 3000. The invalids receive a small sum for pocket-money, which for a private is 2 fr. a month, for a sergeant 4 fr., a captain 10 fr., a colonel 30 fr., and in like proportion for others of intermediate grade. Officers above the rank of captain are allowed to take their meals in their own apartments. In the officers' refectory the service consists of plate and porcelain. The Empress Maria Louisa presented a service of plate

to the Hôtel. The sub-officers and privates are divided into two parties to take their meals, one party breakfasting at nine and dining at four, and the other at ten and five. Soup is served besides in the morning. Their breakfast consists of soup, beef, and a dish of vegetables, and dinner of a ragout with vegetables, or eggs and vegetables. Officers are allowed a few extra dishes. The daily allowance of wine is a pint and three-quarters, and of bread one pound and a half, and these articles are of the same quality for all ranks. Each of the four grand refectories or dining-rooms (one for the officers and three for the privates) is one hundred and fifty feet by twenty-four, and in each there are thirty round tables, at which messes of twelve are formed. Above fifteen hundred pounds of meat are daily put into the coppers, and the same quantity is used for ragouts. The meat and vegetables are cooked by economical furnaces, each of which contains eight coppers. There are two coppers in each of which twelve hundred pounds of meat can be dressed; and in one of the kitchens there is a spit that will roast four hundred pounds of meat at once. There are two kitchens, one for the officers and one for the privates. The principal dormitories comprise eight spacious rooms, each of which contains from forty to fifty beds, and in the smaller sleeping-rooms the number of beds is from four to eight. Each man has his bed, straw mattress, wool mattress, and bolster, and a small cupboard for his clothes. There is a library of twenty thousand volumes for the use of the pensioners, which is open for six hours daily. The Council Chamber contains the portraits of the marshals of France, which are removed here on their death from the Salle des Maréchaux at the Tuileries.

MIND AMONG THE SPINDLES.

THIS is the title of a little work recently published as one of 'Knight's Weekly Volumes for all Readers,' being a selection of articles from an American work, called the 'Lowell Offering,' the production entirely of the young women, "the girls," as they style themselves, employed in the factories of that town. The real good sense, the absence of all affectation, and the fine moral tone evinced throughout, as well as the fact of such an undertaking being carried on through a period of now three years, cannot fail to render the volume interesting to all English readers, and we are induced therefore to give a very short specimen of the manner in which subjects are treated.

THE SPIRIT OF DISCONTENT.

"I WILL not stay in Lowell any longer; I am determined to give my notice this very day," said Ellen Collins, as the earliest bell was tolling to remind us of the hour for labour.

"Why, what is the matter, Ellen? It seems to me you have dreamed out a new idea! Where do you think of going? and what for?"

"I am going home, where I shall not be obliged to rise so early in the morning, nor be dragged about by the ringing of a bell, nor confined in a close noisy room from morning till night. I will not stay here; I am determined to go home in a fortnight."

Such was our brief morning's conversation.

In the evening, as I sat alone, reading, my companions having gone out to public lectures or social meetings, Ellen entered. I saw that she still wore the same gloomy expression of countenance which had been manifested in the morning; and I was disposed to remove from her mind the evil influence, by a plain common-sense conversation.

"And so, Ellen," said I, "you think it unpleasant to rise so early in the morning, and be confined in the noisy mill so many hours during the day. And I think so, too. All this, and much more, is very annoying, no doubt. But we must not forget that there are advantages, as well as disadvantages, in this employment, as in every other. If we expect to find all sunshine and flowers in any station in life, we shall most surely be disappointed. We are very busily engaged during the day but then we have the evening to ourselves, with no one to dictate to or control us. I have frequently heard you say, that you would not be confined to household duties, and that you disliked the millinery business altogether, because you could not have your evenings for leisure. You know that in Lowell we have schools, lectures, and meetings, of every description, for moral and intellectual improvement."

"All this is very true," replied Ellen, "but if we were to attend every public institution, and every evening-school which offers itself for our improvement, we might spend every farthing of our earnings, and even more. Then if sickness should overtake us, what are the probable consequences? Here we are, far from kindred and home; and if we have an empty purse, we shall be destitute of *friends* also."

"I do not think so, Ellen. I believe there is no place where there are so many advantages within the reach of the labouring class of people as exist here, where there is so much equality, so few aristocratic distinctions, and such good fellowship, as may be found in this community. A person has only to be honest, industrious, and moral, to secure the respect of the virtuous and good, though he may not be worth a dollar; while, on the other hand, an immoral person, though he should possess wealth, is not respected."

"As to the morality of the place," returned Ellen, "I have no fault to find. I object to the constant hurry of everything. We cannot have time to eat, drink, or sleep; we have only thirty minutes, or at most three-quarters of an hour, allowed us, to go from our work, partake of our food, and return to the noisy clatter of machinery. Up before day, at the clang of the bell—and out of the mill by the clang of the bell—into the mill, and at work, in obedience to that ding-dong of a bell—just as though we were so many living machines. I will give my notice to-morrow: go, I will. I won't stay here and be a white slave."

"Ellen," said I, "do you remember what is said of the bee, that it gathers honey even in a poisonous flower? May we not, in like manner, if our hearts are rightly attuned, find many pleasures connected with our employment? Why is it, then, that you so obstinately look altogether on the dark side of a factory life? I think you thought differently while you were at home, on a visit, last summer—for you were glad to come back to the mill in less than four weeks. Tell me, now—why were you so glad to return to the ringing of the bell, the clatter of the machinery, the early rising, the half-hour dinner, and so on?"

I saw that my discontented friend was not in a humour to give me an answer—and I therefore went on with my talk.

"You are fully aware, Ellen, that a country life does not exclude people from labour—to say nothing of the inferior privileges of attending public worship—that people have often to go a distance to meeting of any kind—that books cannot be so easily obtained as they can here—that you cannot always have just such society as you wish—that you—"

She interrupted me, by saying, "We have no bell, with its everlasting ding-dong."

"What difference does it make?" said I, "whether you shall be awaked by a bell, or the noisy bustle of a farm-house? For, you know, farmers are generally up as early in the morning as we are obliged to rise."

"But then," said Ellen, "country people have none of the clattering of machinery constantly dinning in their ears."

"True," I replied, "but they have what is worse—and that is, a dull, lifeless silence all around them. The hens may cackle sometimes, and the geese gabble, and the pigs squeal"——

Ellen's hearty laugh interrupted my description—and presently we proceeded, very pleasantly, to compare a country life with a factory life in Lowell. Her scowl of discontent had departed, and she was prepared to consider the subject candidly. We agreed, that since we must work for a living, the mill, all things considered, is the most pleasant, and best calculated to promote our welfare; that we will work diligently during the hours of labour; improve our leisure to the best advantage, in the cultivation of the mind,—hoping thereby not only to increase our own pleasure, but also to add to the happiness of those around us.

ALMIRA.



[Cumæan Sibyl, Sistine Chapel.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXVII.

MICHAEL ANGELO.—*Continued.*

HITHERTO we have seen Michael Angelo wholly devoted to the study and practice of sculpture: but soon after his return to Florence, he was called upon to compete with Lionardo da Vinci in executing the cartoons for the frescos with which it was intended to decorate the walls of the Palazzo Vecchio, or town-hall of Florence. The cartoon of Lionardo has been already described: that of Michael Angelo represented an incident which occurred during the siege of Pisa—a group of Florentine soldiers bathing in the Arno hear the trumpet which proclaims a sortie of the enemy, and spring at once to the combat—he chose this subject, perhaps, as affording ample opportunity to exhibit his peculiar and wonderful skill in designing the human figure. All is life and movement. The warriors, some already clothed, but the greater part undressed, hasten to obey the call to battle; they are seen clambering up the banks,—buckling on their armour,—rushing forward, hurriedly, eagerly. There are, altogether, about thirty figures, the size of life, drawn with black chalk, and relieved with white. This cartoon was regarded by his contemporaries as the most perfect of his works: that is, in respect to the execution merely: as to subject, sentiment, and character, it would not certainly rank with the finest of his works: for, with every possible variety of gesture and attitude, exhibited with admirable and life-like energy, and the most consummate knowledge of form, there was only one expression throughout, and that the least intellectual, majestic, or interesting—the expression of hurry and surprise. While this great work existed, it was a study for all the young artists of Italy: but Michael Angelo, who had suffered in person from the jealousy of one rival, was destined to suffer yet more cruelly from the envy of another. It is said that Baudinelli, the sculptor, profited by the troubles of Florence to tear in pieces this monument of the glory and genius of a man he detested; but in doing so he has only left an enduring stain upon his own fame. A small old copy of the principal part of the composition exists in the collection of the Earl of Leicester, at Holkham, and has been finely engraved.

The next work in which Michael Angelo was engaged was the tomb of Pope Julius II., who, while living, had conceived the idea of erecting a most splendid monument to perpetuate his memory. For this work, which was never completed, Michael Angelo executed the famous statue of Moses, seated, grasping his flowing beard with one hand, and with the other sustaining the tables of the law. While employed on this tomb, the pope commanded him to undertake also the decoration of the ceiling of the Sistine chapel. The reader may remember that Pope Sixtus IV., in the year 1473, erected his famous chapel, and summoned the best painters of that time, Signorelli, Cosimo Roselli, Perugino, and Ghirlandajo, to decorate the interior; but down to the year 1508 the ceiling remained without any ornament; and Michael Angelo was called upon to cover this enormous vault, a space of 150 feet in length by 50 in breadth, with a series of subjects, representing the most important events connected, either literally or typically, with the fall and redemption of mankind.

No part of Michael Angelo's long life is so interesting, so full of characteristic incident, as the history of his intercourse with Pope Julius II., which began in 1505, and ended only with the death of the pope in 1513.

Michael Angelo had at all times a lofty idea of his own dignity as an artist, and never would stoop either to flatter a patron, or to conciliate a rival. Julius II., though now seventy four, was as impatient of contradiction, as fiery in temper, as full of magnificent and ambitious projects as if he had been in the prime of life; in his service was the famous architect Bramante, who beheld with jealousy and alarm the increasing fame of Michael Angelo, and his influence with the pontiff; and set himself by indirect means to lessen both. He insinuated to Julius that it was ominous to erect his own mausoleum during his lifetime, and the pope gradually fell off in his attentions to Michael Angelo, and neglected to supply him with the necessary funds for carrying on the work. On one occasion Michael Angelo, finding it difficult to obtain access to the pope, sent a message to him to this effect, "that henceforth, if his holiness desired to see him, he should send to seek him elsewhere:" and the same night, leaving orders with his servants to dispose of his property, he departed for Florence. The pope dispatched five couriers after him with threats, persuasions, promises, but in vain. He wrote to the Gonfaloniere Soderini, then at the head of the government of Florence, commanding him, on pain of his extreme displeasure, to send Michael Angelo back to him; but the inflexible artist absolutely refused: three months were spent in vain negociations. Soderini at length, fearing the pope's anger, prevailed on Michael Angelo to return, and sent with him his relation Cardinal Soderini, to make up the quarrel between the high contending powers. The pope was then at Bologna, and at the moment when Michael Angelo arrived he was at supper; he ordered him to be brought into his presence, and, on seeing him, exclaimed in a transport of fury, "Instead of obeying our commands and coming to us, thou hast waited till we came in search of thee!" (Bologna being much nearer to Florence than to Rome.) Michael Angelo fell on his knees, and entreated pardon with a loud voice. "Holy father," said he, "my offence has not arisen from an evil nature; I could no longer endure the insults offered to me in the palace of your holiness!" He continued kneeling, and the pope continued to bend his brows in silence; when a certain bishop, who represented the Cardinal Soderini, thinking to mend the matter, interfered with excuses, representing that "Michael Angelo —poor man!— had erred through ignorance; that artists were wont to presume too much on their genius," and so forth. But the irascible pope, interrupting him with a sharp blow across the shoulders with his staff, exclaimed, "It is thou that art ignorant and presuming, to insult him whom we feel ourselves bound to honour; take thyself out of our sight!" And as the terrified prelate stood transfixed with amazement, the pope's attendants forced him out of the room. Julius then, turning to Michael Angelo, gave him his forgiveness and his blessing, and commanded him never again to leave him, promising him on all occasions his favour and protection. This extraordinary scene took place in November, 1506.

The work on the tomb was not, however, immediately resumed. Michael Angelo was commanded to execute a colossal statue of the pope to be erected in front of the principal church of Bologna. He threw into the figure and attitude so much of the haughty and resolute character of the original, that Julius, on seeing the model, asked him, with a smile, whether he intended to represent him as blessing or as cursing? To which Michael Angelo prudently replied, that he intended to represent his holiness as admonishing the inhabitants of Bologna to obedience and submission. "And what," said the pope, well pleased, "wilt thou put in the other hand?" "A book, may it please your holiness." "A book, man!" exclaimed the pope, "put rather a sword, thou knowest I am no scholar." The fate of this statue, however we may lament it, was fitting and characteristic. A few years afterwards the populace of Bologna rebelled against the popedom, flung down the statue of Julius, and out of the fragments was constructed a cannon, which from its origin was styled "*La Giulana*."



[From the Sistine Chapel.]



[From the Vault of the Sistine Chapel.]

On his return to Rome, Michael Angelo wished to have resumed his work on the mausoleum; but the pope had resolved on the completion of the Sistine chapel: he commanded Michael Angelo to undertake the decorations of the vaulted ceiling; and the artist was obliged, though reluctantly, to obey. At this time the frescoes which Raphael and his pupils were painting in the chambers of the Vatican had excited the admiration of all Rome. Michael Angelo, who had never exercised himself in the mechanical part of the art of fresco, invited from Florence several painters of eminence, to execute his designs under

his own superintendence; but they could not reach the grandeur of his conceptions, which became enfeebled under their hands; and one morning, in a mood of impatience, he destroyed all that they had done, closed the doors of the chapel against them, and would not thenceforth admit them to his presence. He then shut himself up, and proceeded with incredible perseverance and energy to accomplish his task alone; he even prepared his own colours with his own hands. He began with the end towards the door; and in the two compartments first painted (though not first in the series), 'The Deluge,' and 'The Vineyard of Noah,' he made the figures too numerous and too small to produce their full effect from below, a fault which he corrected in those executed subsequently. When almost half the work was completed, the pope insisted on viewing what was done, and the astonishment and admiration it excited rendered him more and more eager to have the whole completed at once. The progress, however, was not rapid enough to suit the impatient temper of the pontiff. On one occasion he demanded of the artist *when* he meant to finish it; to which Michael Angelo replied calmly, "When I can." "When thou canst!" exclaimed the fiery old pope. "Thou hast a mind that I should have thee thrown from the scaffold!" At length, on the day of All Saints, 1512, the ceiling was uncovered to public view. Michael Angelo was employed on the painting only, without reckoning the time spent in preparing the cartoons, twenty-two months, and he received in payment 3000 crowns.

To describe this grand work in all its details would occupy many pages. It will give some idea of its immensity to say that it contains in all upwards of 200 figures, the greater part of colossal size; and that with regard to invention, grandeur, and expression, it has been a school for study, and a theme for wonder, during three successive ages. In the centre of the ceiling are four large compartments and five small ones. In the former are represented the Creation of the Sun and Moon: the Creation of Adam, perhaps the most majestic design that ever was conceived by the genius of man; the Fall and the Expulsion from Paradise; the Deluge. In the five small compartments are represented the Gathering of the Waters (Gen. i. 9); the Almighty separating Light from Darkness; the Creation of Eve; the Sacrifice of Noah, and Noah's Vineyard. Around these, in the curved part of the ceiling, are the prophets and the Sibyls who foretold the birth of Christ. These are among the most wonderful forms that modern art has called into life. They are all seated and employed in contemplating books or antique rolls of manuscript, with genii in attendance. These mighty beings sit before us, looking down with solemn meditative aspects, or upwards with inspired looks that see into futurity. All their forms are massive and sublime, all are full of varied and individual character.

Beneath these again are a series of groups representing the earthly genealogy of Christ, in which the figures have a repose, a contemplative grace, and tenderness, which place them among the most interesting of all the productions of Michael Angelo. These and the figure of Eve in the Fall show how intense was his feeling of beauty, though he frequently disdained to avail himself of it. In the four corners of the ceiling are representations of the miraculous deliverance of the people of Israel in allusion to the general Redemption of man by the Saviour: viz. Holophernes vanquished by Judith, David overcoming Goliath, the Brazen Serpent, and the punishment of Haman.

There is a small print in Kugler's Hand-book, which will give a general idea of the arrangement of this famous ceiling; but there is one on a large scale by Pinelli, and a still larger one by Cunego, which if accessible will answer the purpose better. The collection of engravings after Michael Angelo in the British museum is very imperfect, but it contains some fine old prints from the Prophets which should be studied by those who wish to understand the true merit of this great master, of whom Sir Joshua Reynolds said that "to kiss the hem of his garment, to catch the slightest of his perfections, would be glory and distinction enough for an ambitious man!"

CASTS FROM ORGANIZED SUBSTANCES.

For the purposes of the anatomist and the botanist it is often desirable to procure either casts or impressions of objects whose form and surface it is wished to preserve. It may be that a malformation in any part of the body is to be made an object of study, or that the delicate veins in a leaf are to be made the means of investigating the character of a plant: in either case an impression from the object would sometimes answer the same purpose as the original, and hence have arisen many modes of taking such impressions. These methods differ in some respects from those whereby impressions are taken from manufactured articles, and merit a little notice.

Impressions from the leaves of plants are sometimes taken either by smoking them or by dabbing on them a ball covered with printers' ink, and then taking an impression on a piece of damp paper, whereby the minute diversities of surface are portrayed in black and white on the paper. An ingenious modification of this arrangement was devised by Mr. Gill, to enable a botanical tourist to take impressions from plants while out in the field. His apparatus consisted of a dabber, a book, and a cylindrical ruler such as is used in a counting-house. The dabber was simply a small cushion an inch or so in diameter, covered with smooth kid-leather, and adapted to be used in the same way as the large ink-balls employed in printing. The book might be of any convenient size, say an octavo volume an inch thick. It contained, between two of its leaves, a piece of vellum folded in the middle; and the two middle pages of this vellum had a thin coating of printing-ink or some analogous substance, which remained damp by virtue of the oil which it contained. Having chosen the leaves or specimens of a plant, he placed them upon the blackened vellum, and caused them to take up a sufficient quantity of the ink by gently pressing them, one side after the other, with the dabber. The quantity of ink taken up by this method was extremely minute, yet adequate to the purpose. Two impressions were then taken from the leaf at once. A sheet of paper was folded, the inked specimen put within the fold, and the paper placed within the leaves of the book. The book was then laid on a flat spot of ground, the ruler placed on it, and the experimenter, holding by a gate, a post, or a rail, stood on the ruler and worked it to and fro over the book with the whole weight of his body. By this pressure the ink impression was transferred from the leaf to the white paper, and thus produced two copies at once. Mr. Gill stated that in one year he procured by this method several hundred impressions from beautiful leaves and parts of plants. If conducted at home, where more apparatus may be employed, it is recommended that a flat hard board be placed upon the ruler, and the feet be placed on the board, by which a more powerful and equable pressure may be obtained. Of course, where any kind of press is at hand, a more efficient method will be practicable; but the object was to devise a method which should be easily practicable in the open fields.

Some years back Mr. Deeble communicated to the

Society of Arts a method of taking casts from the leaves of plants; and the Society voted a silver Iris medal to him for the communication. In his letter to the Society Mr. Deeble says:—"The object I proposed in making casts similar to the one now submitted, was to supply myself with fac-similes of the form and texture of those plants which, as an engraver, I might have to introduce in the foreground of landscapes. It is well known that those who have obtained eminence in landscape-engraving have devoted a large portion of time to actual study in the fields. I need not allude to the difficulties which deny this practice to a man engaged in a profession demanding his own almost unassisted exertions, especially in a metropolis; nor mention how the inaptness of season or situation will prevent the obtaining of such plants as may be immediately wanted. These circumstances suggested to me the advantage, and a trial proved the practicability, of procuring, at an easy expense either of labour or money, accurate casts of the most common and conspicuous plants."

The method followed by Mr. Deeble was as follows:—The leaf, as soon as convenient after being gathered, was laid on fine-grained moist sand, in a perfectly natural position, having that surface uppermost which was to form the cast, and being banked up by sand, in order that it might be perfectly supported. It was then, by means of a broad camel-hair brush, coated with a thin film of wax and Burgundy pitch, rendered fluid by heat. The leaf being next removed from the sand, and dipped in cold water, the wax soon hardened, and at the same time became sufficiently tough to allow the leaf to be stripped off without altering its form. This being done, the wax mould was placed in moist sand, and banked up as the leaf itself had been; and the mould was filled with liquid plaster of Paris, which was worked into the small depressions by a camel-hair pencil. As soon as the plaster had set, the wax was capable of being removed by a little dexterity; for the solidification of the plaster gave out sufficient warmth to soften the wax in a slight degree, and thus facilitate the removal. The plaster cast thus obtained presented a very perfect copy of the leaf, and might be used instead of it for all the purposes of the engraver.

Some of our eminent sculptors have adopted rather a tedious and complicated mode of obtaining casts of leaves or sprigs. The very finest river-silt is taken, ground up, and made as an envelope to the leaves and sprigs. The whole is dried and thoroughly baked, by which the vegetable substances are reduced to a kind of ash. A strong blast of air is then sent through certain apertures left in the mass, by which the fragments of the leaves and sprigs are blown out, thereby leaving cavities corresponding exactly with them. These cavities then serve as moulds, from which casts can be afterwards taken.

All such articles as fruit and large flowers may be copied in wax by a peculiar arrangement of the details. We will suppose that such fruit as an apple or a pear is to be imitated. One half of the fruit is buried in soft clay, leaving the other half uppermost and exposed. This upper half is moistened with oil, as also the edge of the clay, and liquid plaster is poured on to a considerable thickness. When this is concreted, the fruit is taken out of the clay, and reversed in position, having now the other half uppermost. This half is oiled, as well as the edge of the plaster, and new plaster is poured on till the whole fruit is completely enveloped. When this is dry, the plaster is capable of being removed in two halves, for the oil prevents the edges of the two halves from adhering; and these two, when the fruit is removed from between them, form a mould for future castings. The two parts of the mould being temporarily brought together, a little melted wax is poured through a hole made in the mould, and is shaken about until it coats every part of the interior of the mould. When the wax is dry, the mould is opened, and the wax taken from it in the exact form of the original fruit.

Portions of the skeleton of animals, or anatomical specimens generally, are copied by various means. The most customary method is by means of plaster of Paris. Three kinds of plaster are used: a medium fineness for the mould; the finest for the surface of the cast, poured first into the mould; and the coarsest for the main bulk of the cast, poured into the mould after the finest. In making the mould of plaster, the mode of proceeding depends greatly on the shape of the specimen to be copied; if, like a medallion, it have no 'undercut' surfaces, the mode of procedure is very simple, like that of making the plaster-mould from a medallion; but if the specimen be of a rounded or tortuous form, such as a bone, it would be impossible to make a mould in this way, for the bone would be so completely enveloped in plaster as not to be removed without breaking the plaster to pieces. The contour of the specimen is first examined, to see in how many pieces the mould must be made in order to be removed safely. The specimen is oiled, and then coated with liquid plaster, only in such parts as are to form the first piece or section of the mould. The plaster, while in the act of setting, is spread over with a knife, to make it lie smooth, and is cut neatly round the edges to form a junction with the other pieces. The edges of this partial mould are then oiled, and another portion of mould made in a similar manner. The number of pieces may be from two to a dozen, according to the complexity of the specimen; and each piece is formed singly, but the whole being left on the specimen until the mould is completed. It is then taken off piecemeal (for the oil prevents the pieces from adhering at the edges), and the specimen removed from within. These several pieces, when required to form a mould for casting, are bound together, and a hole is made at which the liquid plaster can be introduced; after which the removal of the mould piecemeal enables the cast to be liberated. If we look at the plaster-casts in the shops of the Italian image-makers, we shall see that many of the figures have seams or projecting lines on their surfaces; these arise from the joinings of the moulds in which they were cast, in the manner just noticed.

There are many occasions in which it would be desirable to have a mould in one piece, which could not be effected if made of plaster; whereas if some elastic substance were used for the mould, it would yield sufficiently to allow the cast to be removed easily. Mr. Douglas Fox, of Derby, in a communication to the Society of Arts (for which a silver medal was awarded), described a mode of employing glue for this purpose. He said, "Having been much employed in taking casts of anatomical preparation, I frequently met with specimens, principally of hard substances, that did not admit of the moulds hitherto employed being removed from them. This arose from any given specimen of such description having various portions of it with considerable overlays; that is, there were hollows or undercut parts from which no mould could be withdrawn without its being injured. Although in many instances soft clay or soft wax may be used to take impressions, still these in numberless instances cannot be removed from the body to be moulded without being injured in those parts which were pressed into the hollows."

To obviate these inconveniences, Mr. Fox used glue in the following manner:—The specimen to be moulded was oiled, secured about an inch above the surface of

a board, and then surrounded with a wall of clay about an inch distant all round, and rising to a greater height than the specimen. Into the cell thus formed, thick, strong, melted glue was poured, until the specimen was completely enveloped. The glue, when in a state sufficiently set to be handled, was cut into two or more pieces by a sharp knife, and the specimen removed from the inside. These pieces, when afterwards temporarily put together, formed a mould which had many advantages on account of its elasticity. In the mould thus made casts were formed of plaster of Paris, or sometimes of wax; for it was found that wax, if not heated too highly, will cool in the mould so quickly as to leave the glue unacted on. Mr. Fox sent, as specimens of this art, casts of a deer's horn and of a calculous concretion, very rough on the surface; and on the expression of a desire on the part of the Society to know whether the softer parts of anatomical preparation could be moulded in a similar way, Mr. Fox sent a cast of a specimen which could not have been moulded in any way but with an elastic mould, such as of glue.

Professor Schreibers, of Vienna, some years ago took casts in metal of the internal parts of the ear,—by which we are to understand, the cavities in a particular bone of the skull. The bone was first placed in a crucible, and covered with sand, leaving the opening into the ear uncovered. It was then heated red-hot, until all the volatile animal matter was destroyed. The whole was removed from the fire, and allowed to cool; and fusible metal was poured through a small funnel into the cavity of the bone, till full. The bone itself was next eaten away by exposing it to the action of dilute muriatic acid; and the metal was thus liberated in the exact form of the cavities themselves.

It seems not improbable that electro-metallurgy will come in aid of this art, as of many others. An organized specimen, whether of vegetable or animal structure, may be either coated with a permanent film of metal, or may have a metallic mould formed from it, according to the object in view. For instance, an apple or a pear may be thus treated. It is first brushed over with blacklead, and then a small pin is thrust in at the stalk; and to this pin is connected the wire belonging to the zinc end of a galvanic battery; and the fruit is immersed in the solution of sulphate of copper, in which a piece of copper is also placed. By the action of the apparatus, a film of copper becomes deposited on the fruit. Cucumbers, potatoes, carrots, and various other vegetables may be coated in a similar way. After the objects are coated, the pin is withdrawn, and a little hole is thus left through which the juices of the vegetable may evaporate, and thus promote the complete drying of the encased object. The copper film retains its form even after the vegetable object has almost shrivelled away. Leaves and delicate twigs may be coated with copper or other metal in a similar way. On this point Mr. Smee states, "The beauty of electro-coppered leaves, branches, and similar objects, is surprising. I have a case of these specimens placed on a black ground, which no one would take to be productions of art. In the same room with them are a couple of those cases in which Ward has taught us to grow in this smoky metropolis some of the most interesting botanical specimens. In these cases are contained varieties of fairy-formed *adiantums*, verdant *lycopodiums*, brilliant *orchideæ*, rigid *cacti*, and creeping *hygodiums*, all growing in their natural luxuriance. The electro-coppered leaves, however, are beautiful when placed by the side of the productions of this miniature paradise; and when I state that the numerous hairs covering the leaves of a *melastoma*, and even the delicate hairs of the *salvia*, are all perfectly covered, the botanist must at once admit that these specimens have rather the minuteness of nature than the imperfection of art."

So far the application is merely to give a metallic surface to the organized substance; but by carrying on the process until a thick deposit be obtained, instead of merely coating the object, a mould will be obtained, from which casts may be made either by electric agency or by the usual means; and such casts will present the minutest points of diversity on the surface of the object. Some specimens of this kind are now to be seen in the exhibition of the proposed modes of decoration for the new Houses of Parliament, in King-street, St. James's.

Education of Children.—In the education of children, love is first to be instilled, and out of love, obedience is to be educed. Then impulse and power should be given to the intellect, and the ends of a moral being be exhibited. For this object, this must be effected by works of imagination; that they carry the mind out of self, and show the possible of the good and the great in the human character. The height, whatever it may be, of the imaginative standard will do no harm; we are commanded to imitate one who is inimitable. We should address ourselves to those faculties in a child's mind which are first awakened by nature, and, consequently, first admit of cultivation; that is to say, the memory and the imagination. The comparing power, the judgment, is not at that age active, and ought not to be forcibly excited, as is too frequently and mistakenly done in the modern systems of education, which can only lead to selfish views, debtor and creditor principles of virtue, and an inflated sense of merit. In the imagination of man, exists the seeds of all moral and scientific improvement; chemistry was first alchemy, and out of astrology sprang astronomy. In the childhood of these sciences, the imagination opened a way and furnished materials on which the ratiocinative power in a maturer state operated with success. The imagination is a distinguished characteristic of man, as a progressive being; and I repeat that it ought to be carefully guided and strengthened as the indispensable means and instrument of continued melioration and refinement.—*S. T. Coleridge.*

Cornish Miners.—The fifth volume of the Transactions of the Royal Geological Society of Cornwall, treats of mining operations. The Cornish miner, says the 'Athenæum' in its review of this work, is naturally brave and often reckless. He delights in overcoming difficulties—his patience and perseverance is of the most marked kind, and in many parts of the country, he has constructed works, which testify to his hardihood and determination. At Botallack Mine, which is worked for a considerable distance under the Atlantic Ocean, the miners were tempted to follow the ore upwards to the sea, but the openings made were small, and the rock being extremely hard, a covering of wood and some cement sufficed to exclude the water and protect the workmen from the consequences of their rashness. Mr. Henwood, the author, thus describes a visit made by him and one of the mine-captains to a mine in the same district with Botallack, and similarly situated:—"I was once, however, underground in Wheal Cock during a storm. At the extremity of the *level* seaward, some eighty or one hundred fathoms from the shore, little could be heard of its effects, except at intervals, when the reflux of some unusually large wave projected a pebble outward, bounding and rolling over the rocky bottom. But, when standing beneath the base of the cliff, and in that part of the mine where but nine feet of rock stood between us and the ocean, the heavy roll of the large boulders, the ceaseless grinding of the pebbles, the fierce thundering of the billows, with the crackling and boiling as they rebounded, placed a tempest, in its most appalling form, too vividly before me ever to be forgotten. More than once, doubting the protection of our rocky shield, we retreated in affright, and it was only after repeated trials that we had confidence to pursue our investigations. Almost all the mines in the parish of St. Just, near the Land's End, are similarly situated, and the positions of several of the steam-engines are highly picturesque: perched on the verge, and even on the ledge of a tremendous precipice, they seem at the mercy of every storm, and to the beholder from beneath, they almost appear suspended in the air, and tottering to their fall." In the Cornish mines are 30,000 persons employed, averaging 18,472 men, 3764 women, and 3764 children.



[Naworth Castle.]

NAWORTH CASTLE.

Such of our readers who love to contemplate the things of 'long ago' will have heard of the accidental destruction by fire of this noble edifice with no few pangs of regret, a feeling rendered more poignant by the reflection that when these things pass away there is no replacing them. Naworth Castle in days of yore was one of the strongholds of the English barons of the Border, and, until this lamentable accident, one of the finest relics of departed times in the north. Although it had long ceased to be the continued residence of its owner the Earl of Carlisle, it was kept in a habitable condition, and during a few weeks in the shooting season the junior members of that nobleman's family were glad to exchange the splendour of Castle Howard for the inconveniences of Naworth.

This ancient abode of feudal hospitality was well worthy of the many visits that were paid to it by tourists in search of the picturesque. It stood about twelve miles from Carlisle, and was within a short distance of the line of railway which connects that city with Newcastle-upon-Tyne. Perched upon a rocky eminence near the river Irthing, its turrets commanded an extensive view over a district that once was the scene of bloody contests and hurried spoliation. Very different is the prospect now-a-days visible from that eminence. Cultivated fields, varied at intervals with woods and interspersed with smiling hamlets and farms, stretch northwards for many a league until the Scottish border highlands terminate the boundary of the view with their blue outline. The castle was erected about the year 1335 by one of the Dacres, a family of whom we shall have something to say hereafter, and rising as it did out of a "noble cloud of trees" mantled with ivy and crowned with embrasured towers, its appearance instantly excited that respect which the venerableness of antiquity invariably commands. It was built on the edge of a ravine, with walls of enormous thickness, and calculated in every respect to afford those offices of protection which its local position required. It was four-sided, but not square, enclosing a court-yard, and having its principal front on the south, on which side the edifice was upwards of two hundred feet long. The chief entrance was also on this side, leading through a handsome gateway into an outer court, and then by a narrow arched passage under the guard-room into the great courtyard. The view that presented itself upon emerging from the archway was strikingly picturesque. Ivy clambered up the walls, doorways surmounted with coats of arms elaborately cut in stone with all the pride of heraldry conducted into the numerous apartments whose mullioned windows peeped from amongst the ivy tods back into the court: all these objects made up a picture which vividly brought you face to face with years that slipped by two centuries ago. In a dreamy humour you would expect to see some fair damsel unbarring her casement-window above, or to hear the heavy tread of a booted trooper on the pavement in the court below. To pass from the poetry of the past to some remains of its stern reality, let us take a few steps to the left, and there under the great western tower we shall find the dens wherein the Dacres and Howards were wont to immure the object of their displeasure for the time being, were he Scotch or English. No light was admitted, and scarcely could the air find its way through the long tortuous apertures to the interior. A large iron ring fixed to the wall of one dungeon showed that upon occasion even free range in this cavern was too much liberty. Perhaps the reader may remember that the famous moss-trooper William of Deloraine, who figures in the 'Lay of the Last Minstrel,' was unwillingly a three months' denizen within these walls.

> "And when I lay in dungeon dark
> Of Naworth Castle, long months three,
> Till ransomed for a thousand mark,
> Dark Musgrave! it was long of thee."

Issuing from these places and crossing the courtyard, a flight of steps led up into the baronial hall, seventy feet by twenty-four, containing some suits of steel armour, and a fireplace planned after the good old fashion. The dimensions will scarcely be credited—it was seventeen feet from one side to the other! The dining-room contained several portraits, but these were hung so provokingly high that it was impossible to examine them with the attention that portraits of historical personages deserve. This room also contained some suits of steel armour and a quantity of storied tapestry. Hurrying onward from these rooms on the ground floor, let us proceed to the guard-room in the south front, forming a gallery one hundred and sixteen feet in length. This was the museum of Naworth, and in it were hung several paintings and such [illegible] are usually termed 'curiosities'—boar-spears, swords, claymores, &c. The servant who conducted the stranger through the edifice always pointed out with

peculiar pride many memorials of Belted Will Howard preserved here—his cradle, saddle, gloves, belt, &c. This last was the article of dress from which Lord William derived the epithet by which he is usually known: it is "the broad and studded belt" of Sir Walter's poem. It was evidently of foreign manufacture, as the metal studs formed upon it a rhyming distich in German, which reminded the wearer, if he was able to decipher the words, that, powerful as he might be, there was one still more powerful. No doubt the ignorant common people, ever prone to superstition, ascribed supernatural virtues to the baldrick; the more so as the wearer was a brave soldier, and executed with untiring assiduity the duties of his office as Lord Warden of the Marches. Amongst the portraits in the long gallery was a fine one, by Vandyke, of Charles I., with the shadow of an ominous time on his countenance. Portraits of other persons, royal and noble, were placed here, most of them poor enough as works of art; but one of Raleigh, with a complexion naturally dark, seeming to have been rendered still more dusky by indulgence in smoking tobacco (for he affected the weed with the strength of a first love), irresistibly caught the attention.

The apartments occupied by Belted Will were reached by a passage which left the guard-room at its eastern extremity. The sleeping apartment was the first room the visitor was shown into, and a small comfortless place it looked. By pushing aside one of the wainscot panels, the entrance to a secret recess was exhibited. It was perfectly dark, vaulted with stone, and so artfully concealed and strongly guarded that its occupant might fearlessly listen to the search of enemies in his very dormitory. Lord William, we are told by Camden, who once paid his lordship a visit here, was "a lover of venerable antiquity," and as hard a student of what books existed at that time as his military pursuits permitted. Some relics of his library remained up to the breaking out of the fire, but the collection of books had been, in his day, much larger. Upon examining the catalogue "of my books at Naward," drawn up by his lordship's order, it seemed that the greater portion of them consisted of works on controversial theology and history. It gratified us to notice that 'Shakspere's Plays' and 'Purchas's Pilgrims' were amongst the number, as well as works of Camden, Speed, and Raleigh. One book had the autograph of Fisher, Bishop of Rochester. There were several manuscripts also, and with others one written upon six large skins of vellum, and placed within a wooden case with two folding leaves, measuring two feet by three. It was richly illuminated, and the subject was the life of Joseph of Arimathea and his twelve disciples. The oratory was next the study, and contained some valuable sculptures in white marble, supposed to have been brought from the neighbouring priory of Lanercost. These rooms, says Sir Walter Scott, "impress us with an unpleasing idea of the life of a lord warden of the marches. Three or four strong doors separating them from the rest of the castle indicate apprehensions of treachery from the garrison; and the secret winding passages through which he could privately descend into the guard-room, or even into the dungeons, imply the necessity of no small degree of secret superintendence on the part of the governor. As the ancient books and furniture have remained undisturbed, the venerable appearance of these apartments almost lead us to expect the arrival of the warden in person." We believe the poet was in error as to the passages leading to the dungeons from the apartments occupied by Belted Will, since none such after diligent search could be found.

The rooms on the south side of the castle, which overlooked the court-yard, were used by the Earl of Carlisle and his family, when residing there, as sleeping apartments. One bed was called *the lady's fortune*, in consequence, it is said, of the wife of one of the old barons, endowed with an extravagant imagination and five hundred pounds, having expended her whole pecuniary dowry upon it.

THE CHEESE-DISTRICTS OF ITALY.

THE day may perhaps come when agricultural chemistry will afford the means to one district of producing that which is now the characteristic of another. If ever the analysis of soils and of vegetable growth shall be placed on a clear and undisputed basis, it is reasonable to expect that the causes will be explained why one spot is fitted for the growth of one particular kind of produce, and what combination of circumstances will give similar productive powers to other spots. The production of cheese well illustrates the diversity in this respect, and the extent of our general unacquaintance with the causes of the diversity. Why does Cheshire cheese differ in flavour from that of Gloucester; and both of them from Cheddar; and all three of these from Stilton; and these again from others that might be pointed out? The mode of manufacture is one cause of the difference, and the relative mixtures of cream and of milk is another; but the flavour which the pasturage gives to the milk is probably the most prolific source of diversity, and the one concerning which there is yet most to be learned. Italy has its cheese-districts as well as England, and a few details respecting them may not be uninteresting.

In the Milanese district is manufactured a fat cheese called *Stracchino* or *Strachina*. It is made from a mixture of cream and unskimmed milk. The finest quality is made at Gorgonzola, about twelve miles to the east of Milan, to which place milk in the coagulated state is carried from other districts. The cheese is sold fresh at about one franc the large pound of twenty-eight ounces (about five pence per English pound). Old cheese of this kind is much esteemed. The "quartirolo" strachina, or strachina cheese made in the fall of the year, is produced from migrating herds called *bergamini*, which, in the autumn, descend into the plains, and establish themselves there for a time. In Murray's 'Handbook for Northern Italy,' a small place called Cascina de' Pecchi is noticed, at a short distance from Milan, as being "a famous cheese-district, of less extent than that about Lodi, but nevertheless of considerable importance to the agriculturist. The cheese is called Strachina. This cheese passes through several phases; when fresh, it is much in taste and look like Stilton. The most delicate kind is called Mascarsino; when it is kept, it is called Mascarsone, and then becomes very strong, so strong as to give a complete victory over those who unfortunately rank cheese amongst their enemies."

The Lodi district, alluded to above, is however the most famous cheese-district of Italy. The same writer whom we have above quoted states—"The *Lodigiano*, the country about Lodi, is the native seat of the cheese usually called *Parmesan*, but which is almost wholly made in this district; the Parmigiani, however, having been the first to export the article, it acquired their name. Others, on the contrary, say that a Princess of Parma having introduced it at a French table, it received its denomination from *her* own excellency as well as that of the cheese. To carry on the business of a cheese-dairy to advantage, the milk of at least fifty cows is needed; but the land being very much divided into small holdings, many of the farmers have not a sufficient extent of pasturage. They therefore join with their neighbours in a kind of partnership, the

milk being brought into a common dairy, where it is kept in very large copper vessels, and the produce divided. The deep yellow colour is given by saffron."

It is, however, to Bowring's Report on the trade and productions of Tuscany that we must look for fuller details of this district and its system. From this valuable source we learn that the district which produces the Parmesan cheese is about twenty miles wide, from Milan to Pavia and Lodi, and double that length, from Abbiategrasso to Codogno. The cows set apart for this purpose are about eighty thousand in number. It is seldom found profitable to rear them in the immediate neighbourhood; they are brought from Switzerland, from Tyrol, and from Bavaria. They are purchased at the age of three or four years, and continue to give milk abundantly for about seven years. There are ten or twelve thousand imported every year, at a price varying from fourteen to twenty pounds sterling each. At the end of the seven years, when they are no longer serviceable for cheese-making, they are sold for three or four pounds a-piece. About seventy thousand calves are produced annually in the district; and these sell at from twelve to thirty shillings each, to be consumed as food in the towns. About as many pigs are kept as there are cows, since the whey will afford the main part of their food: and these sell for an average price of about thirty shillings each. Taking all these things together, it is found that the worn-out cows, the calves, and the pigs, sold in each year, produce a sum rather greater than the purchase-price of the young cows every year, leaving the butter and cheese to represent the agricultural value or profit of the system.

It is estimated that each of the cows in the district yields about a hundred and forty pounds of butter annually on an average. This is sold by the farmers to the retailers at about seven pence per pound, and by them retailed at a moderate profit. The cheese produced from each cow is about two and a half times this quantity every six months. There are two qualities of the cheese, the one called *la sorte maggiore* (the May lot), and the other *la sorte quartirola* (the winter lot), the whole produce being collected twice in the year. The average price is about five or six pence per pound.

After two or three years' seasoning in the warehouses of the merchants, who are principally at Codogno in the province of Lodi, and Corsico in the province of Milan, the weight of the cheese is found to have diminished about five per cent. Of the thirty million pounds of cheese produced annually in the district, about half is of smaller market-value than the rest, arising either from a defect in quality or a defect in shape.

The whole produce of the Parmesan (so-called) district in cheese and butter is valued at about thirty-two millions of francs (about a million and a quarter sterling) per annum. With respect to the district itself, there are three kinds of pasture used for the cows: viz. the *marcito* (constantly-flooded meadow-land), the *irrigatorio stabile* (merely irrigated ground), and the *erbatico* (rotation meadow-ground). The marcito is quite an indigenous cultivation. It consists in dividing the ground into many small parallelograms, sensibly inclined to one side. The water which fills the little canals between the parallelograms overflows these spots slowly, and by the inclination of the ground falls into a lower canal. From this again it is diffused over other parallelograms, until at length the whole meadow is flooded. This kind of pasture maintains a rapid and continual vegetation. The *irrigatorio stabile* is a kind of irrigated pasture calling for no particular remark; and the *erbatico* consists of a rotation of meadow with rice, grain, flax, Indian corn, and oats.

Some years ago, Mr. Arthur Young and Mr. Pryse both described the mode of making the Parmesan cheese from their own observations. The following are the chief points in the method:—At ten o'clock in the morning, five and a half 'brents' of milk (each brent being about twelve gallons) are put into a large copper, which is suspended over a slow wood fire. After the milk has been stirred for about an hour, and has attained a lukewarm state, a little rennet is squeezed through a cloth into the milk. The copper, suspended by a crane, is then removed from over the fire, and left stationary for about an hour, at the end of which time it is stirred up. When the whey has separated a little from the curd, the *cazaro*, or dairyman (for cheese-making is not women's work in Italy), examines the state of coagulation, and gives instructions to his *sotto-cazaro*, or assistant, to commence working. This working consists in breaking or dividing the curd by means of a stick armed with cross-wires. The curd having subsided, and part of the whey removed, the copper is again suspended over the fire, where it is exposed to a pretty strong heat, but not so high as to reach the boiling-point. A little saffron is added; the contents of the copper are kept agitated by a wooden stirrer; and the *cazaro* from time to time examines the whey, by means of his finger and thumb, to determine when the right degree of solidity and firmness of grain is attained. At the proper time, three-fourths of the remaining whey are poured off, and the copper is cooled sufficiently to enable the curd to be taken out on a coarse cloth. The cloth is placed in a tub to drain, and is then placed within a hoop, with about half a hundredweight laid upon it for an hour. The cloth is next taken off, and the whey, now beginning to assume the form of cheese, is placed on a shelf in the same hoop. At the end of two or three days, it is sprinkled all over with salt. The same process is repeated every second day for thirty or forty days; two cheeses being placed one upon another, in which way they are said to receive the salt better. When the salting is completed, the cheeses are scraped clean, and are rubbed and turned every day while in store. A little linseed-oil is applied to the surface, to protect them from insects. The cheeses are never sold till they attain the age of six months.

There are other districts in Europe where a sort of fame has been acquired for the production of cheese possessing some quality or other of a peculiar kind. Such, for example, is that of *Gruyère*, in Switzerland. There is most probably a peculiarity either in the pasturage of the district, or in the mode of cheese-making, or in both, which gives to Gruyère cheese a flavour for which it has become celebrated throughout Europe. Forty thousand hundredweights of this cheese are made yearly, the greater part of which is exported.

Bridges in the Himalaya Mountains.—Another kind of bridge, called Suzum, is formed of twigs very indifferently twisted; there are five or six cables for the feet to rest upon, and side ropes about four feet above the others to hold by, connected with the lower ones by open wicker-work, or ribs, one or two feet apart. The side ropes are at a most inconvenient distance from each other, and in one place they are so far asunder that a person cannot reach both with his extended arms. The ropes, from being constructed of such frail materials, do not bear much stretching, and the bridge forms a curve the sixth part of a circle. Frequent accidents have occurred, and only a month before I crossed in August last, two people were lost by one of the side ropes giving way. The guides that accompanied me did not tell me of this until they saw ten or twelve of my loaded followers on the bridge at once.—*Account of Koonawur, by the late Capt. Gerard.*



[Cottages at Henfield.]

RAMBLES FROM RAILWAYS.

THE ADUR, ARUN, AND WEY.—No. I.

WITHOUT departing from the plan on which we commenced this series of our rambles—that of following the windings of a river—we purpose in the present paper to conduct such of our readers as will accompany us over a somewhat longer course than we have yet led them. "Somer is ycomen in," as the old poet sings; and among the many delightful things that come with it, none is more delightful than the opportunity it affords to some—alas! that it is to so few—of the care-worn sons of toil, of a brief respite from their daily labour and anxiety. In a large city almost all are overwrought—mind and body are alike overstrained, and become enervated unless they sometimes seek quiet and repose, and, by availing themselves of free Nature's grace, obtain a renewal of health and vigour. All who can should make a summer holiday, however short; for not alone is the health improved thereby, knowledge streams in upon the mind, a season is afforded for thoughtfulness; we can in seclusion look before and after, ponder on our past course and see where we have erred, and form plans of manly purpose for the future; while by communing with those of different pursuits and interests to our own, some of our prejudices are brushed away, and we learn to look with more kindly feelings on all; and the taste is refined and chastened by a return to simple natural enjoyments, and an absence for awhile from the feverish excitement of the city.

Thus, if we mistake not, it will be found that along with the buoyancy of health come an expansion and purification of the mind—nay, may we not say—something of a renovation of the whole man? Nought like a solitary ramble among the mountains for this purpose. But there are many who can make a short holiday, yet to whom a mountain trip is quite impracticable: for such we are about to point out a route that will lead them through a variety of beautiful scenery, and that offers at the same time many attractions to the man of science and the lover of our national antiquities; while it will yield an abundance of enjoyment to those who are prepared, as every pedestrian ought to be, to draw pleasure from every wholesome source.

The course we intend to take is to follow the Sussex Adur from its source till it falls into the sea; then to [illegible] along the sea-shore till we reach the mouth of [illegible] by means of a cutting, with the Wey; and then [illegible] Wey till that river unites with the Thames. We shall thus twice cross the county of Sussex, and once cross Surrey; and in so doing pass through much of the finest scenery in each county.

The scenery of Sussex has been often praised, and sometimes highly, yet many are little aware of its richness and variety. The attractions of more distant counties have caused it to be unfairly neglected. Tourists seldom keep in mind that—

> "To know that which before us lies in daily life
> Is the prime wisdom;"

but value scenery as some folks value old china, for its being unattainable near home. Scenes that they would scarcely look at a second time if within reach by an hour's ride, they fall into raptures over if they need two or three days to arrive at. But our business is to describe, not to rail; and we must call attention to choice spots when we come upon them, without heeding whether others will admire them or not.

The Adur has really three or four sources; one is about two miles from Slinfold, another about as far from Nuthurst in Sussex—and all the Sussex rivers rise in the county—these unite near West Grinstead; they are swelled by a brook that rises near West Chiltington. But the stream that we take as our guide has its source near Slaugham. This we can easily and pleasantly reach from the Balcombe station of the Brighton Railway. We leave the station on our left, and crossing a field, come at once into the lane that leads to Slaugham—and a most delightful lane it is. If we wanted to give any one a favourable notion of a thoroughly countrified English lane, we could not select a better. The proximity of the railway has done nothing to destroy its rural character. It is as unpolished and unimproved as Sir Uvedale Price or Mr. Gilpin could desire; but then, how it abounds with wild flowers which they would not have stooped to look at! We never saw a lane more full of flowers, or of choicer and lovelier kinds, than this lane in this present spring. From it and the neighbouring wood few young botanists but would be able to find a new specimen or two for their herbarium. Then there are a cottage or two and a farmhouse, just enough to break the continuity of hedge-row pleasantly, and not sufficient to destroy the quiet. There are some fine trees in the hedges too, and peeps between them across the Weald, which stretches away on our left, with a huge barrier of lofty downs beyond. On a clear bright day, with just clouds enough in the sky to chequer with their flitting shade the level stretch of scenery, and to relieve the uniformity of the distant downs, the tourist will hardly wish for a more lovely prospect.

The source of our river is in a corner of St. Leonard's Forest; and we may remark in passing, that the sources of the rivers Adur, Arun, and Ouse, which run through Sussex, and a feeder of the Surrey Mole, rise within a circle of three or four miles diameter. St. Leonard's Forest was in olden times the scene of the doings of a mighty serpent. An account of him and his proceedings was published at the time, under the following title: 'True and Wonderful. A Discourse relating to a strange monstrous Serpent or Dragon, lately discovered and yet living, to the great annoyance and divers slaughters both of Men and Cattle, by his strong and violent Poison, in Sussex, two miles from Horsam, in a Wood called St. Leonard's Forest, and thirty miles from London, this present month of August, 1614. With the true generation of Serpents.' This "serpent or dragon, as some call it, is reported to be some nine feet, or rather more, in length, and shaped almost in the form of an axletree of a cart, a quantity of thickness in the midst, and somewhat smaller at both ends. The former part, which he shoots forth as a neck, is supposed to be an ell long; with a white ring, as it were, of scales about it. The scales along his back seem to be blackish, and so much as is discovered under his belly appeareth to be red; for I speak of no nearer description than a reasonable ocular distance. For coming too near it, hath already been too dearly paid for, as you shall hear hereafter. It is likewise discovered to have large feet, but the eyes may be there deceived; for some suppose that serpents have no feet, but glide upon certain ribs and scales, which both defend them from the upper part of their throat unto the lower part of their belly, and also cause them to move much the faster. For so this doth, and rids way (as we call it) as fast as a man can run. He is of countenance very proud, and at the sight or hearing of men or cattle will raise his neck upright, and seem to listen and look about with great arrogancy. There are likewise on either side of him discovered two great bunches so big as a large foot-ball, and (as some think) will in time grow to wings; but God, I hope, will (to defend the poor people in the neighbourhood) that he shall be destroyed before he grow so fledge. He will cast his venom about four rods from him, as by woeful experience it was proved on the bodies of a man and woman coming that way, who afterwards were found dead, being poisoned and much swelled, but not preyed upon." This forbearance of the monster is accounted for by his taste leading him to prefer the flesh of rabbits to that of men and women; and there was in his neighbourhood "a coney-warren, which he much frequents." But if his taste was delicate, as much can scarcely be said of his person, which used to leave "a track or path behind it (as by a small similitude we may see in a snail) which is very corrupt and offensive to the scent." There are plenty of vouchers for the truth of what is told, and the careful writer informs us that the serpent was seen, among others, by "the carrier of Horsham, who lyeth at the White Horse in Southwark, and who can certify to the truth of all that has been here related; by John Steele, Christopher Holder, and a widow woman living at Faygate." Mr. Halliwell, in his 'Rare of Bramber,' suggests that the pamphlet was "probably a satire on some obnoxious proprietor;" but there is nothing in it to countenance such a supposition, and the editor of the 'Harleian Miscellany,' in vol. iii. of which it is reprinted, evidently conceived it to be written in good faith—if he did not believe the story, of which we are not quite certain. He says, "This relation breathes such a spirit of sincerity, seems so well attested, and tallies so well with what has been advanced on the same head by the best ancient and modern historians, that we cannot well doubt of its truth." We leave our readers to form their own conclusions, only calling attention to the rigid scrupulosity of our chronicler as evinced in what he says about the "reasonable ocular distance," his scepticism about the "large feet," and his judicious reference to "the carrier who lyeth at the White Horse."

Slaugham has few attractions, nor is our river here of any consequence; but the Ouse forms a good-sized pond by Slaugham mill. From Slaugham we may cross directly to Bolney, and in our way we shall meet with some extensive views over the downs. The neighbourhood about Bolney is very beautiful, and there is something picturesque in the appearance of the old worn-out looking church as it stands on a bit of a hill, with the in-and-out village below it. The Adur is here a pretty rivulet; it is said that salmon are sometimes taken in it, and trout larger than would be expected from its tiny size. Some years back the parish clerk of Bolney caught a trout here that weighed twenty-two pounds; he sent it to Brighton as a present to George IV. Our river now flows by Twineham and Shermanbury, at which last there is (or was, a few years ago, for we did not think to look after it when in the neighbourhood the other day) the gateway of an old mansion called Ewhurst. Shermanbury and its vicinity—which may perhaps remind the visitor of 'our Village'—abound in pleasant spots, which we might well dwell on for awhile, were there not so much before us. Soon after it leaves Shermanbury the Adur is joined by the streams we spoke of above, which flow past West Grinstead, and is made navigable for barges as far as Mock bridge. The rambler will do well to proceed by the road, or better by the bye-lanes, from Shermanbury to Henfield, instead of following the river.

Most leisurely walkers will find this enough for their first day's journey, and Henfield is a convenient resting-place. The town, if such it can be called, is old and respectable; the neighbourhood pretty enough to employ a few hours very pleasantly in surveying it; and the White Hart is an excellent house to put up at—good accommodation, good living, and a civil landlord. Henfield church is a plain edifice of the perpendicular style of architecture; it has been somewhat injured by modern churchwardens, yet is by no means uninteresting. It has a fine window of the fifteenth century; the others are more recent, and not handsome. There are a few curious monuments. In the chancel there are the effigies in brass of a woman and a boy, with some verses on the latter, which show that "fine writing" does not belong exclusively to our generation. The boy, Menelcb Raynsford, died in 1627; and the writer tells us—

> "Great Jove hath lost his Ganymede, I know;
> Which made him seek another here below;
> And finding none, not one, like unto his,"

till he saw Master Menelcb, he speedily seized upon him; and he now, instead of

> "A child on earth, is made a saint in Heaven."

There have been some queer saints made ere now by the Roman pontiff, as everybody who has read Middleton knows; but we doubt if he ever made one so odd as Ganymede's successor.

Whoever wanders much among the scenery of Old England should not fail to regard with some attention the domestic architecture of the several counties; we mean, especially, the cottage architecture. Like most other homely relics, our cottages are fast crumbling away. Flimsy, wretched cottages, that seem mainly raised to show with how few bricks a house can be built, are everywhere taking their places—at least in our southern and eastern counties, where bricks are used; and in our northern and western it is little better

so far as character is concerned. We do not mean to say that the cottager is worse housed than he used to be. It is not so, but rather the reverse. And where those more substantial tenements to which we have called attention are found in the occupation of cottagers, it should be borne in mind that, in all probability, they were originally farm-houses, when farms were held in smaller sizes than they now are; or they were the houses of persons of a higher grade than the cottager, but who now occupy more showy dwellings. The cottages formerly were, no doubt, almost universally mud or clay huts, such as are still common in Hampshire, especially about the New Forest, and are not uncommon in some other counties. But the kind of cottage of which we speak is numerous in the middle parts of Sussex, and there are few places better than the neighbourhood of Henfield to seek them in. Backed by high lands, or a clump of fine old trees, in order to shelter them from the northern and easterly winds, their situation is almost always eminently picturesque, and they are always adapted to their situation; while their bold projecting gables, &c. allow a fine play of light and shade, and thus heighten the general effect. On a humble scale, they exhibit much of that kind of excellence Sir Joshua Reynolds remarked in the edifices erected by Vanbrugh (see his Thirteenth Discourse). They are built of dark red bricks, with very frequently tiles of various sizes and fancy shapes as a facing to the gables, as well as a covering to the roofs: some of them, but not many, are partly built of wood. The chimneys are a feature eminently characteristic. In nearly all recent domestic buildings of an inexpensive character the chimneys are an absolute and unqualified deformity. Yet the most cursory view of one of these stacks would show how greatly that necessary portion of an English house may be made to conduce to its general appearance. The old houses scattered over these southern counties have a considerable similarity of character, and yet there is a distinct individuality, so to speak, in those of each county. The chimney-shafts of a Sussex cottage are larger and more massive, but not quite so highly ornamented as in the Kent cottages, though more ornamented than those of Surrey and Hampshire; and they are different from each. We had thought of engraving a few to illustrate our remarks; but we shall content ourselves with calling the rambler's attention to them, assured that it is these small matters, these local details, that give much of the proper tone to a pedestrian trip. The rambler will do well to notice these cottages: as they stand out from their background of deep-green trees, with their massive chimneys relieved perhaps by a bright blue sky, and with their lively groups of pigs, dogs, and children about their doors, they will yield him many a rustic picture such as he will scarcely meet with in an exhibition-room. As we said, they are passing away; and the cottages now erecting, or lately erected, are only four flat brick walls, with strait holes for the windows, and for the chimneys a miserable thing without an atom of ornament except some staring red chimney-pots. True, there is here and there a cottage of a more ambitious character starting up, and there are some smart park lodges; but in these finery usurps the place of ornament, and seldom does there appear to be any attention given to the local character of the old houses in the neighbourhood; but rather a kind of pattern-house is erected, such as can be speedily obtained from some of the pattern-books that are occasionally put forth for the guidance of those who find it easier and more profitable to adopt the fashion of the day, than by thought and observation to produce such an adaptation of the old forms about them as may be suitable for present wants, and yet seem as if inspired by the genius of the place. We give at the head an engraving of one of the old houses at Henfield let out as cottages.

BAGPIPES.

Though the music of the Bagpipes is now rarely heard in any other countries than Scotland and Ireland, yet, as a musical instrument, they have soothed the ears of early ages in various and distant climes. Like many other things that have passed into disuse and forgetfulness, they contributed to the pleasures of lordly halls before the march of science had added to invention or elevated taste. The simplicity of their original construction would in itself, if other were wanting, be a sufficient evidence of their antiquity, and, indeed, a satisfactory reason why they are not now to be heard but among the humbler classes of two countries, in one of which they are preserved because of the martial recollections they inspire, and in the other because found, by a poor but musical people, to be the instrument most suited to their airs and most available to their circumstances. By many the bagpipe is considered as essentially Irish and of Hibernian origin; but though Ireland cannot lay claim to its invention, she may assume high credit for its improvement, having given to the shrill pipes of the Caledonian a more complicated form, and consequently a more harmonious and modulated tone. The Irish bagpipes are not inserted in the mouth; they consist of a chanter or flute, and three drones, two short ones and a long one, all of which are filled by a pair of small bellows, inflated by a compressive motion of the arms, the action of the air upon the reeds which are inserted in the chanter and drones producing the music. The chanter has eight holes, beginning with the letter D in the treble; the short drones sound in unison to the fundamental E, and the large drone an octave below it. The chord of drones which the Irish gave them is supposed to be the chorus of Cambrensis. The bagpipes is the only instrument on which, since the disuse of the harp, the native Irish music can be played to advantage, for, being constructed on the chromatic scale, they are well adapted to a national music composed entirely on that system. The celebrated Dr. Burney, in a letter to the author of the 'Irish Bards,' thus writes of the Irish bagpipes:—"Of their antiquity I have little evidence. The instrument at present in use in Ireland is of an improved kind, on which I have heard some of the natives play on two drones, which is never attempted in Scotland. The tone of the lower notes resembles that of a hautboy or clarionet, that of the higher the German flute; and the whole scale of one I heard lately was very well in tune, which has never been the case with any Scotch bagpipe I ever heard." O'Conor the historian says that one of the instruments in use among the *Scotch*, or ancient Irish, was the '*adharcaidh*,' that is, a collection of pipes with a bag; and he also informs us that the '*rinkey*,' or field-dance of the Irish, was governed by the '*cuisley-cinil*,' a bagpipe of more simple construction. In the description of the Hall of Temora, now Tara, translated from ancient MSS., and published in the 12th No. of 'Collectanea Rebus Hib.,' there is mention of a place being allotted for the 'cuisluinaigh,' a word signifying bagpipers. The native Irish pipers still call their bellows '*bollog na cinisti*,' that is, the bellows of the *cinisti*, or veins of the arm, on the inside in the first joint, and this joint on the outside being called *ullan*, or *uilean*, the elbow. Vallancey concludes that the *ullan* and cinisti pipes were similar. The *ullan* are also the same as the '*woolen*' pipes of Shakspere, mentioned in the fourth act of the 'Merchant of Venice.' The *Ullamhain re-Dan*, or rhapsodists, who, after the harp of their country was hanged upon the willow, assumed the

humbler bagpipe to give tune to the melodies of their country's sorrow, have long ceased to exist even in the remote parts of Ireland; and the instrument is almost unexceptionably degraded to the hands of the blind beggars and the strolling vagabonds. The lower classes have abandoned it for the fiddle, and in a few years the note of an instrument that characterised her will not be heard in Ireland. We know of one or two families where the piper is still retained; but it is more to keep alive historic associations than from any appreciation of the actual merits of the music. The improvement made by the Irish in the construction of the bagpipe disqualified it for martial airs; and the instrument's want of compass, even in its improved state, renders it unfitted to the advance of the science of modern music. In the hands of the *seanachaidhe*, or the *oirsidigh*, it was, no doubt, well adapted to

"Stir the memory of a thousand years,"

and awaken in the Irish heart

"Chords that vibrate sweetest pleasure,
And thrill the deepest notes of woe;"

but now it is fast disappearing, and will shortly be found only in the collection of the antiquary. But the Scotch pipe, which is vastly inferior as an instrument of melody, and which Robertson says is "the voice of uproar and misrule," is daily winning patronage. The Queen and some of the English nobility now retain a Highland piper, not so much to feast their ears, perhaps, "wi' the skirl o' the chanter," as to please the eye with the costume of the musician.

The pibroch of the Highland pipe, heard in the "land of mountain and of flood," has no doubt exciting charms for the hardy mountaineers, for its music is described as being that of "real nature and rude passion;" but its coming under 'Southron' patronage must not be referred to any falling off of taste in the fastidious circles of the south, but rather attributed to the animating influence of the pipes on the spirits of the Scotch regiments during the late war. Many anecdotes are told of the "power of the pipes" over Caledonian valour, at Waterloo and many of the preceding fields. Even Lord Byron, in 'Childe Harold,' has not omitted to allude to their effect. As these must be fresh in the remembrance of most readers, we shall content ourselves by mentioning an anecdote of a more distant period. It is told, that when the British troops were retreating in great disorder at the battle of Quebec, in 1760, the general complained to an officer of Fraser's regiment of the bad behaviour of his corps. "Sir," said the officer with much warmth, "you did wrong in preventing the pipers to play this morning; nothing encourages the Highlanders so much in action.' Even now they would have been of use." "Let them, then," exclaimed the general, "blow like the fury, if it will bring back the men!" The pipers were ordered to strike up, and scarcely had they begun when the Highlanders returned and formed with alacrity. After the battle of Porto Nuovo, Sir Eyre Coote was so sensible of what advantage the pipes had been, that he gave 50*l.* to the Highlanders to buy another pair. Pennant, in his 'Tour in Scotland,' says — "The loudest and most piercing of all music is the genuine Highland pipe, and suited well the warlike genius of the people—roused their courage to battle—alarmed them while secure, and collected them when scattered, and solaced them in their long march, and in time of peace kept up the memory of the gallantry of their ancestors."

There were formerly colleges at Skye and Mull for teaching the music of the pipes; and at present the Highland Society distribute annual premiums to encourage them.

The Romans borrowed the pipes from Greece. They were introduced into Britain at the Roman invasion, and immediately adopted by the Scotch as an instrument "suited to their warlike genius;" and from Scotland they were introduced to Ireland, where, as we have already said, they were much improved.

Edward III., Queen Elizabeth, and James I. of Scotland kept pipers among the musicians of their household, and James was said to be an excellent performer himself. Chaucer, in speaking of the Miller, says—

"A bagpipe, well cowde, he blewe and sounde;"

and again he mentions it under the name of Cornamuse, which is the name given it by the Italians—

"Cornamuse and shalmes, manye a fleyte and little horne"

It is mentioned by St. Jerome in a letter to Dardanus. In France, in the fifteenth century, it was in the 'Danse des Aveugles;' and is among the instruments represented in the 'Dance of Death' at Basle, in Switzerland. Montfaucon supposes Virgil to allude to it in the 'Æneid;' and Boccaccio mentions it in his account of the Plague of Florence, A.D. 1348.

WAKES AND BURIALS.—No. I.

IRISH WAKES.

An Englishman associates with the word "wake" lively ideas of periodic enjoyment. An Irishman connects it with ideas of enjoyment, but of casual rather than periodic recurrence. Previous to the Reformation, the English "wakes" were similar to the "encœnia," or feasts held in commemoration of some patron or saint. Though specially forbidden about the middle of the seventeenth century, and though the object of their institution is now generally lost sight of, they are notwithstanding continued: more, however, for general recreation than the revival of saintly recollections. These feasts, termed "patrons" in Ireland, are still religiously observed. But an Irish "wake," though sometimes a scene of rude merriment, is ever an assembly intended to do honour to the dead. The "lyk-wake" of Wales and Scotland very much resembled the wakes of Ireland, but Protestantism and civilization have cut the features of resemblance away, and the Irish "wake," unaltered in its observance, is regarded as a national characteristic. It was a very ancient custom to bring musicians and story-tellers to the house of death, to comfort the survivors as well as to honour the departed. We find in the ninth chapter of St. Matthew, that when Jesus went to heal the ruler's daughter, he did not arrive until after her decease, and "when he came, he found the minstrels and the people making a noise." We learn from Homer, that the ancient Grecians had games in honour of their dead; but these games were as often after cremation as before it. The Egyptians preserved the remains of their relatives by embalming them, but it does not appear that there was any peculiar observance before the process.

The Athenians, after battle, kept their dead unburied for three days, that their respective friends might have an opportunity of identifying and carrying them home. The Romans did not bury their dead for seven days after decease; but this delay was precautionary rather than honorary, and their choral outcry was more an alarm than a lamentation. The British "lyche-wakes" and Irish "wakes" have been and are more like that mentioned by St. Matthew, than they are to any other recorded in ancient history. It would seem that the earlier Christians retained many of the social rites of Judaism, and that the Church of Rome, seizing upon these, perpetuated them.

The lyche-wakes began to be discontinued in England shortly after the Reformation. Spalding says that "the reading of Holy Scripture and singing of

psalms was *discharged* at *lyk-wake* by the town-council of Aberdeen, at the suggestion of Cant and his fellows;" yet it seems that they could not altogether suppress them. Chaucer makes mention of them in the 'Knight's Tale'—

> "Ne how Arcite is brent to ashen cold,
> Ne how the lyche-wake was y-hold
> All thilke night, ne how the Grekes play
> The *wake* places—the kepe I not to say."

Dryden speaks of the dead-watching under the simple term "wake"—

> "Putting all the Grecian actors down,
> And winning at a *wake* their parsley crown;"

parsley being what the crown was made of at the Grecian and Roman games in honour of the dead. Dryden evidently uses the word "wake" in the same sense that it is used in Ireland. Pennant says that in his time, when a Scotchman died, the wife, the son, daughter, and nearest of kin opened a melancholy ball, dancing and *greeting*—that is, crying violently—while a bagpipe or fiddle "discoursed sweet music." This was continued night after night until the corpse was buried. In Pennant's Welsh Tour there is a description of a Welsh wake, which resembles Spalding's account of the Scotch wakes in the days of Cant more closely than it does Pennant's own which we have given above. "In North Wales," says Pennant, "the night before a dead body is to be interred, the friends and neighbours of deceased resort to the house the corpse is in, bringing with them some small present of bread, meat, and drink (if the family be poor), but more especially *candles*, whatever the family may be; and this night is called *gwyl nos*, which may mean either a night of lamentation or a watching-night. Their going to such a house, they say, is to watch the corpse. While they stay together, they are either singing psalms, or engaged in religious exercise. Whenever anybody comes into a room where a dead body lies, the first thing he does is to fall on his knees and say the Lord's prayer." In England and Scotland the promiscuous assembling of neighbours in the house of death has ceased, and none now approach the house of mourning but those whose duty or connection calls them.

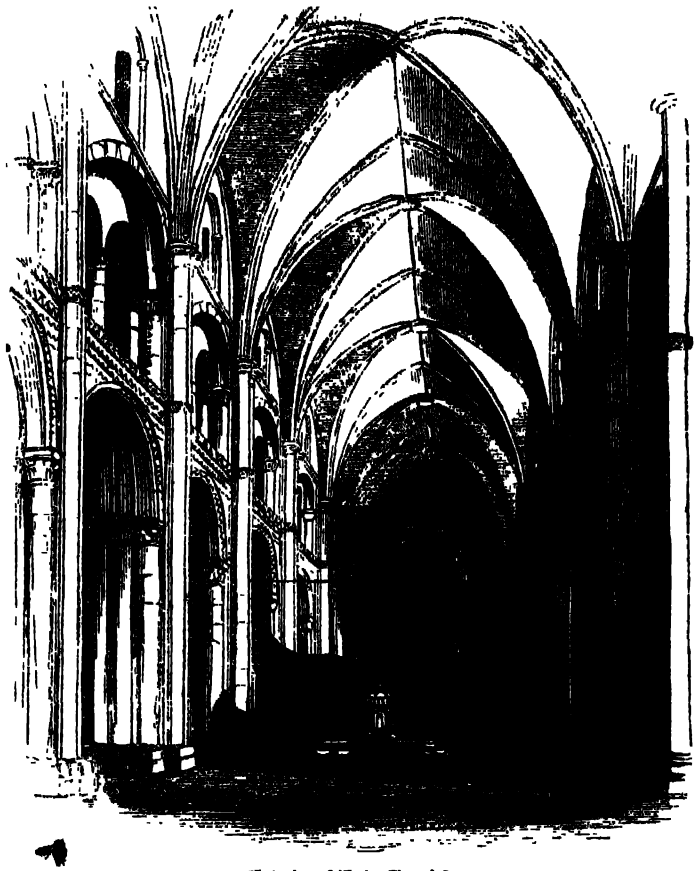
In Ireland a "wake" brings together most of the parish, old and young; and when the dwelling-house is deemed not sufficiently commodious, the "barn" is prepared for their reception. Every one is welcome, as the numbers at the "wake" and "berrin" are regarded as the criterion of the estimate in which the dead was held; and pipes, tobacco, and refreshments being given gratuitously and in extravagant profusion, numbers are rarely wanting, unless the deceased had been particularly obnoxious. We have known old beggars in Ireland who laid up a certain sum weekly, as they themselves said, to "bury their."

At the moment that the vital spark is passing from its tenement, the Irish fall on their knees in awful silence, and offer up an earnest prayer: and at such a time even the agony of a wife is dumb, or manifests itself only in the wringing of her hands or mournful oscillation of the head. When the soul is supposed to have taken wing, the corpse, while yet warm, is washed and 'laid out:' the curtains of the bed are exchanged for white sheets, which are fantastically hung; if there be a picture of the crucifixion, which few cabins in Ireland are without, it is pinned over the head of the corpse, while a 'missal' is frequently inserted under the chin, and a plate of salt, with a candle, placed upon the breast as emblems of immortality and eternity. When all is arranged, the nearest friends of the deceased, who had been excluded until now, are admitted "*to see how he looks*," a loud and terrible burst of sorrow now takes place; and their stricken hearts pour forth copious torrents of unavailing woe. The dead is invoked by name, and scolded for his unkindness in leaving; the wild and singularly impressive "Och! why did ye—Och! did ye die!" now swells into the "*Keen*," to which the company lend a melancholy chorus, till the shout of woe crowds upon the passing wind, and is borne to the ear of the distant traveller in those sweet and solemn cadences that have frequently entranced and astonished the hearer.

The merits and exploits of the departed in his lifetime are now told and dwelt upon with pride and satisfaction; the thoughts of the mourners are ingeniously carried by the narrator from the present to the past, and some good-hearted fellow, watching the gradual recovery of spirits, takes courage to *sing out* one of the dead man's favourite and funniest songs; the effect is electric; the Irish heart, always in a state of transition, is immediately lighted up with the surrounding humour, and he who, but an instant before, was most inconsolable in his grief, is now inextinguishable in his laughter. What a temperament, and how happy but for its extremes! Now universal fun and universal smoking prevails: the matrons occupy the room in which the corpse is laid, and talk over their own several reminiscences of the "poor fellow that's stiff and cowld lyin' there this blissid night." If there be a parlour, it is possessed by the old men, who smoke and drink and talk of bygone times or passing events, while the younkers of both sexes have the kitchen, and are engaged in all sorts of play, "hunt the slipper," "hammer, block and bible," "blind man's buff," &c.; nor are they unmindful of the "bakkey," and the "grog." The children of the deceased may be seen taking part in the amusements, evincing no less jocularity than the "nabors." The 'Irish Hudibras' (1682) gives a lively picture of an Irish wake.

> "To their own spots—the masses ended—
> The mourners now are recommended,
> Some sit and chat, some laugh, some weep,
> Some sing *cronans*, and some do sleep,
> Some court, some scold, some blow, some puff,
> Some take tobacco, some take snuff,
> Some play the trump, some trot the hay,
> Some at *mochan*, some noddy play,
> Thus mixing up their grief and sorrow—
> Yesterday buried—killed to-morrow."

During the existence of the aboriginal factions, the "wakes" were at times the choice spots for encounter, and many a frightful and dishonouring scene has been witnessed; but they are in error who assert that almost every "wake" has terminated in a "row." The free indulgence in spirituous liquors occasionally led to fighting and confusion; but these delinquencies at "wakes" were not general, and when they did occur were attributable to jealousy or faction. Now they are never heard of. They sit up at their "wakes" until morning admonishes them of work, and the corpse of the poorest is "kept," as they call it, for three nights, each night being passed as the first. So partial are the Irish to "waking" their dead, that fever or contagious disease does not frighten them to a suspension of their habits. While the cholera was spreading death and desolation, it required all the vigilance of the boards of health to prevent the peasantry from "waking" the victims of the pestilence; nor even at that careful period did dread of consequences keep the neighbours from coming together in the house of death to manifest their respect for the departed. The Irish are a people of warm affections and keen sympathies; these, along with the popular religion, tend to keep up the habit of "waking" in Leinster, Connaught, and Munster, while a different faith and different order of people are causing its discontinuance in Ulster.



[Interior of Christ Church.]

CHRIST CHURCH, HAMPSHIRE.

The church, of which our engraving shows the interior, is a large and fine building dedicated to the Holy Trinity, but is only a fragment of the larger establishment of the Priory, of which the foundation was said to have been laid in the Roman era, and which doubtless gave rise to the town, and has bequeathed it its name; the less known and Saxon name being Twynhambourne, descriptive of the situation between the two streams of the Avon and the Stour, which join just below the town, and fall into the sea at Christchurch Bay. We take the following account of it from 'Old England.'

The first establishment of the house is lost, as we have already stated, in the darkness of antiquity, but in the twelfth century we find Ralph Flambard, that turbulent and oppressive, but able and zealous prelate, busily engaged rebuilding the whole, and obtaining the necessary funds by seizing the revenues of the canons, allowing each of them merely a sufficiency for his subsistence. We may imagine the confusion, the dismay, the uproar, though, unfortunately, no Sydney Smith was then among the oppressed to record their feelings and sentiments, as on a somewhat similar occasion in our own time. The dean, Godric, resisted the bishop with all possible energy, but was, in consequence, degraded from his office, and obliged to seek refuge on the Continent; and though he was ultimately allowed to return, it was only in a spirit of due obedience to his superior. Flambard, having removed all opposition, levelled the old buildings to the ground, and raised the new ones, of which considerable portions exist to this day: these are to be found in the nave, the south-western aisle, and the northern transept. But let it not be supposed that Flambard obtained all the honours of this mighty work. According to a legend told by the monkish writers, he had supernatural assistance. Whenever the workmen were engaged in their labours, there was observed one workman of whom no one could tell from whence he came, or what he was, except that he exhibited a most extraordinary indefatigability in the business of raising the monastery, and an equally extraordinary liberality in declining to be paid anything for what he had done; at the times of refreshment, and of settlement of wages, he was ever absent. And so the work progressed, until near completion. One day a large beam was raised to a particular place, and found, unfortunately, to be too short. The interrupted and embarrassed workmen were unable to remedy the defect, and retired to their dwellings for the day. The next morning, when they returned to the church, there was the beam in its right position, longer even than was required. The strange workman immediately occurred to every one's thoughts; and the general conclusion was, that the Saviour himself had been the supernatural assistant.' The dedication of the pile to Christ was in later ages attributed to this circumstance, and hence comes the name of Christ Church. Nay, if there are any persons very anxious about the legend, we believe they may yet find some who will show them in the church what they hold to be the very miraculous beam itself. It is probable that Christ Church was originally founded in the earliest days of Christianity in England, on the site of a heathen temple, the usual

mode in which the shrewd missionaries of Rome at once attested the triumph of the new over the old religion, and reconciled the people to the change, by adopting their habitual places of worship. In the course of the last century there was discovered, in the Priory foundations, a cavity about two feet square, that had been covered with a stone cemented into the adjoining pavement, and which contained a large quantity of bones of birds—herons, bitterns, cocks and hens. Warner, a local antiquarian writer, observes that, among the Romans, "many different species of birds were held in high veneration, and carefully preserved for the purposes of sacrifice and augural divination. Adopting the numerous absurdities of Egyptian and Grecian worship, their tolerating conquerors had affixed a sacredness to the cock, the hawk, the heron, the chicken, and other birds; the bones of which, after their decease, were not unfrequently deposited within the walls of the temple of the deity to whom they were considered as peculiarly appropriated." Portions of the Priory yet remain, and a visitor to the neighbourhood occasionally hears of the convent garden, now a meadow, of Paradise, the appropriately named place of recreation for the scholars of Christ Church school, and forming also a relic of the Priory,—of vestiges of fish-ponds and stews. But the church is the only important part of the Priory now existing, which, apart from its architectural characteristics, exhibits many interesting features. Including St. Mary's Chapel at the eastern end, and the tower at the western, the church extends to the distance of three hundred and eleven feet. The parts of the building which may be separately distinguished are the Norman remains already noticed, the porch or principal entrance, and the tower, with the great window nearly thirty feet high. On the under sides of the benches of the stalls are a series of satirical and grotesque carvings, representing, there can be little doubt, the monkish opinions of the friars. In one is seen a fox with a cock for his clerk, preaching to a set of geese, who are greedily imbibing the doctrines he puts forth. In a second the people are typified by a zany, who, while his back is turned upon his dish of porridge, is saved the trouble of eating it by a rat. A third exhibits a baboon with a cowl on his head, reposing on a pillow, and exhibiting a swollen paunch. From what we know of the origin of the friars, who sprung up to reform the state of idleness and sensuality into which the monks and clergy generally had fallen, one would think the last of these pieces of carved satire must have told much more strongly against its authors than its objects. Another very curious carving is the Altar-piece, which Warner supposes to be coeval with Bishop Flambard. If so, it is one of the most extraordinary things of the kind existing in England. The carving represents the genealogy of Christ, by a tree springing from the loins of Jesse. On each side is a niche, one containing a statue of David, the other Solomon. Above these sit the Virgin with the child Jesus, and Joseph, and surrounded by the Magi. Projecting heads of an ox and an ass remind us of the manger, and of the flight to Egypt. Still higher are shepherds with their sheep, the former looking up toward a group of angels, over whom, at the apex of the carving, God extends his protecting arms. Exclusive of all these figures, which are mostly mutilated, there are niches which contained nine others, and there are a host of small figures of saints, thirty-two in number, also in niches, and each bearing his particular emblem or distinguishing mark. The chief individual memories of Christ Church are connected with the noble family of the Montacutes, Earls of Salisbury. By them was the noble tower at the west end erected in the fifteenth century: by them were the two small chantries in the north transept raised; by them was the beautiful, but mutilated chapel—to the north of the altar—left to excite the admiration of visitors to the church by its beauty, to stir at the same time their deepest sympathies and warmest indignation as it reminded them of the noble and most unhappy lady whose fate that mutilation may be said to commemorate. The chapel was erected by Margaret, Countess of Salisbury, for her own resting-place, when in due course of nature she should have need of it. But the venerable mother of the eloquent Cardinal Pole, the man who had refused to minister to the depraved appetites of Henry, and subsequently held him up to the scorn and abhorrence of the European world, was not likely to die a peaceful death in England during that monarch's lifetime. In 1538 the chief relatives of the Cardinal, namely, Lord Montacute and Sir Geoffrey Pole, his brothers, and the Countess, his mother, were suddenly arrested, with the Marquis of Exeter and others, on a vague charge of aiding the Cardinal, as the King's enemy; and Geoffrey, the youngest, having pleaded guilty and made a confession involving the remainder, on a promise that he should be pardoned for so doing, the two noblemen were beheaded on Tower Hill. A month afterwards, on the ground of some alleged discoveries made through the wreck of a French vessel on our shores, fresh arrests took place; and parliament was instructed to pass bills of attainder against the living mourners of the recent victims of the scaffold,—namely, the Countess of Salisbury, her grandson, the child of Lord Montacute, and the widow of the Marquis of Exeter, and with them were associated two knights. The Countess was then seventy years of age, but behaved not the less with so much firmness and presence of mind on her examination before the Earl of Southampton and the Bishop of Ely, that these personages wrote to their employer, Cromwell, saying she was more like a strong and constant man than a woman, and that she denied everything laid to her charge; and that it seemed to them either that her sons had not made her "privy or participate of the bottom and pit of their stomach, or that she must be the most arrant traitress that ever lived." Some of the Countess's servants were examined, and, no doubt, tampered with; still no sufficient material for a criminal trial was to be obtained. What next? Dismissal to their homes, no doubt, under almost any other English monarch: not so under the rule of the cruel Henry; so a bill for their attainder, without the form of a trial, was obtained from the parliament, which should be considered scarcely less infamous than the king to allow itself, as it did, to be the constant agent of his personal malignity. The two knights were executed; the Marchioness of Exeter was pardoned some months later; and what became of the boy does not appear: but as to the Countess, two years after the high nobility and commons of England had authorized the murders sought at their hands, and when men's minds thought the affair had reached its bloody conclusion at last, the people of England were horrified, those at least whom the never-ceasing wholesale state executions had not entirely brutalized, to hear that the aged Countess had been dragged to the scaffold after all, on the ground of some new provocation given by her son, Cardinal Pole, and that one of the most frightful scenes in English history had taken place on the occasion of the poor lady's death. When told to lay her head on the block, she answered, "No! my head never committed treason; if you will have it, you must take it as you can." The executioner strove to detain her, but she ran swiftly round the scaffold, tossing her head from side to side, while the monsters struck her with their axes, until at last, with her grey hair all dabbled in blood, she was held forcibly to the block, and an end put to her misery. There is, as we have already partly intimated, an appendant to this

awful picture to be found in the history of Christ Church. It might have been supposed that even Henry would be glad to let such events pass as soon as possible into oblivion; but his satellites knew him better; so when the commissioners were at work at the time of the Reformation, they took care to tell him, in relation to their visit to Christ Church—"In the church we found a chapel and monument made of Caen stone, prepared by the late mother of Reginald Pole for her burial, which *we have caused to be defaced*, and all the arms and badges clearly to be delete [erased]."

WAKES AND BURIALS.—No. II.

BURIALS.

One of the first and grandest funeral processions upon record is that which accompanied the remains of Jacob. We are told that "Joseph went up to bury his father, and with him went all the servants of Pharaoh, the elders of his house, and all the elders of the land of Egypt, and all the house of Joseph, and his brethren and his father's house; and there went up with him both chariots and horsemen, and it was a very great company." The Egyptians have left to the world their pyramids and catacombs as abiding evidences of the sacredness they attached to sepulture. The Hebrews derived many of their funeral ceremonies from the Egyptians, deviating from the customs of that people only where a different faith required and distant time necessitated. Embalmment or interment was, with both, the mode of disposing with the dead in the beginning. Balming of corpses afterwards pretty generally prevailed, and the men of Jabesh-Gilead are the first we read of using it in doing the last offices to Saul. The Greeks suspended all business and closed their shops when their relatives were dead. It was customary with them to put a piece of money in their mouth, make an oration over them, then place them on a funeral pile, which was lighted by the nearest relatives, while others poured upon it libations of wine, &c. The Romans sent out a crier to invite the people to the funeral, just as at the present day messengers and circulars are sent round in England. When the deceased was carried forth, the hearse was preceded by trumpeters, and old women called "præficæ," who sang songs in praise of the departed; the children and next of kin followed the hearse attired in mourning suits. After the oration a finger was cut off, which was buried; the remainder of the body was then burned, and the ashes gathered in an urn and laid in a sepulchre.

The early Christians deposited the body entire in the earth. The bier was carried by the nearest relations, and accompanied by a band singing psalms. The Indians of the present day burn their dead or launch them on the sacred waters of the Ganges. The Chinese go to the most extravagant expenses in their funerals. Fellowes, in his 'Asia Minor,' says of the Greeks, "The outward marks of respect are scarcely visible in their burial-grounds, little more being left to mark the place of interment than a row of stones indicating the oblong form of the grave; but a pipe or chimney formed of earthenware rises a few inches above the ground and communicates with the corpse beneath, and down this tube libations are poured to the attendant spirit of the dead. The custom of hiring women to mourn with cries and howlings is also retained by the modern Greeks."

We see what a close resemblance the early funeral ceremonies of all countries bore to each other, and how men in all times and in every land combined to consider sepulture the most sacred duty owed to fellow-man, because, perhaps, the last. Superstition and varying faiths introduced much that was ridiculous and discrepant, and we find in the middle ages of Christianity absurdities introduced that lessened the sublimity of the simple ceremonies transmitted by the sons of Noah, and alloyed the poetry and spirit of the observance. Thus Aubrey, in his 'Miscellanies,' which are among the Lansdowne MSS., describes a custom which was in vogue as late as the reign of Charles II. "In the county of Hereford," writes he, "was an old custom at funerals, to hire poor people who were to take upon them the sins of the party deceased. One of them, a long, lean, ugly, lamentable rascal, lived in a cottage on Ross highway. The manner was, that when the corpse was brought out and laid on a bier, a loaf of bread was brought out and delivered to the sin-eater over the corpse, as also a mazar bowl of maple, full of beer, which he was to drink up, and sixpence in money; in consideration, he took upon him, ipso facto, all the sins of the defunct, and freed him or her from *walking* after dead."

The ancients seemed to bury wherever they fancied, nor were they obliged to carry their dead to a cemetery consecrated for public use; each might choose and consecrate his own. Joseph of Arimathea had his sepulchre in his own garden; Samuel was interred in his own house; Moses, Aaron, Joshua, and all kings and great men were buried in mountains. In Christendom no burying-places were permitted near cities until after the third century, nor did burials take place in or near churches until close on the fourth century; hereditary burying-grounds were forbidden until the twelfth.

The ancient Christians continued to follow the custom of the Romans in pronouncing orations over their dead. Eusebius pronounced a eulogy over Constantine, Ambrose over Theodosius, and Gregory the brother of Basil delivered an oration over the Bishop of Antioch. Orations became general among the Christians, and after a short time were modified into *funeral sermons*. These were perverted into fulsome panegyric, and were weak or exaggerated according to the amount of the stipend paid for their delivery. Even infamous characters have been shameless and callous enough to bequeath a sum of money to the clergy on condition of their preaching their funeral sermon. Granger mentions a case of a disreputable woman named Cresswell, who desired to have her funeral sermon preached, and left ten pounds to the clergyman, but upon the express condition that he only spoke well of her. A preacher with difficulty was obtained to undertake the task: after a sermon on the general subject of morality, he concluded, saying, "By the will of the deceased, it is expected I should mention her, and say nothing but what is *well* of her. All I shall say of her therefore is —She was born *well*, she lived *well*, and she died *well*, for she was born by the name of Cress*well*, she lived in Clerken*well*, and died in Bride*well*." Funeral sermons have long grown into disuse. The celebrated sermons on the death of the Princess Charlotte were the last public ones. It was the custom in the rural districts of England to accompany the body to the grave with singing, and to strew the way with flowers as it passed. Thus Ophelia sings:

"White his shroud as the mountain snow,
Larded with sweet flowers;
Which bewept to the grave did not go,
With true-love showers."

The flowers which were scattered on the bier or on the grave were such as emblemed the condition and fate of the dead. Stanley in 1651 wrote as follows:—

"Strew
Upon my dismal grave
Such offerings as ye have,
Forsaken cypress and sad yewe,
For kinder flowers can take no birth,
Or growth from such unhappy earth."

Washington Irving deplores the discontinuance of these simple and soul-touching customs, and charges civilization with trampling out the poetry of life. The Irish '*berrin*' still retains every primitive characteristic, and when not disgraced by drunken excesses is highly calculated to stir those emotions that spring from faith and lead to devotion. The coffin is carried by friends, and preceded by a crowd of women whose 'wild ululula' makes the hills re-echo to its mournful melody, and roll it along until inanimate nature seems to join in the dirge. Immediately after the mourners follow boys and girls bearing crosses of lath, painted white and festooned with ribands; then comes the priest, sometimes sprinkling holy water as he goes; behind the coffin follow the immediate relatives, and after those the men who have come to attend the ceremony. Every stranger that meets the sad procession takes off his hat and turns a few paces with the funeral; if a woman meets it, she joins the chorus in front for a few minutes, and uttering a prayer for the deceased goes on her way. The falling of the first clod upon the coffin in the grave draws forth the wildest and loudest lament, which continues until the grave is covered. The crosses which were borne at the funeral are now planted at the head and foot, and the grave being sprinkled with holy water, the ceremony is ended. The burying-grounds of the Irish Roman Catholics being mostly remote from towns, the effect of one of those simple funerals passing through a quiet valley, or winding along some lone ravine, is truly grand and impressive. The 'keen' is musical and full, and loads the very atmosphere with the reality of deep sorrow. The red and blue cloaks of the women and long frieze 'trustys' of the men, seen at a distance have all the grace of Grecian drapery, and the crosses decked with ribands or flowers show in the slanting sunbeam like the wands of a fairy group: besides, they always bury in the evening; a time well chosen indeed, for the hush of evening, when reposing nature seems to calm itself in honour of the last repose of humanity, accords well with the solemnity of the office.

These funerals are confined to the Roman Catholics of Connaught and Munster, with a few counties in Leinster. The Protestants in no part of Ireland allow the 'mourners,' while in Ulster neither Roman Catholics nor Protestants have them. It seems most likely that in a few years civilization will have extinguished the 'keen' of the Irish as well as the poetry of the English funerals.



[Bramber Castle.]

RAMBLES FROM RAILWAYS.

THE ADUR, ARUN, AND WEY.—No. II.

FROM Henfield we may stroll down to the meadows, and along by the river, past the little unassuming church of Beeding, and so round to Bramber; but it will be better to cross the bridge at once on reaching the river, and, leaving Ashurst on our right, proceed directly to Steyning. We need not hurry, though; the river is indeed not so beautiful as it might be, and would be, were not its banks kept trim for the convenience of navigation; but, to make amends, there are wide and fertile meadows, well dotted with trees, and with abundance of cattle grazing about them; and bounded by a lofty range of downs, here rising bold and abrupt, and there more softly undulating,—scenery, in a word, just such as the rambler likes to linger along. Steyning is an ancient town, and a very interesting one. There are too some old houses about it, and the church is old and of much beauty. Britton, in his 'Architectural Antiquities' (v. 210), refers to Steyning church as containing some genuine Norman architectural features; and Rickman speaks of it as possessing some of the finest Norman enriched mouldings, with a variety of excellent and elaborate detail which deserves attentive study Steyning is a good example of a

sequestered country-town, and perhaps will make a more convenient resting-place than Henfield.

In rambling over this Weald, as the low ground we have just come along is called, it should not be forgotten that, though not exactly in this locality, it was in this Weald that Mantell's geological marvels—the enormous Iguanodon, the strange Hylosaurus, and stranger Pterodactylus—were discovered. The wealden formation may be well observed in various parts of the valley of the Adur, whose bed, indeed, is formed by a fissure in that formation. This is not the place to go into details on that subject; the reader who wishes for local information respecting the wealden formation will find it in abundance in Dr. Mantell's 'Geology of the South-east of England,' and a sufficiently full account of the remains above referred to, in his 'Wonders of Geology.' The remains themselves are a striking feature in the collection at the British Museum.

As we follow our river, we shall soon see before us, on an elevation on our right, a fragment of the grey old keep of Bramber Castle. It has a picturesque appearance as we see it from the river. The mound on which it stands is hidden by trees that are carried nearly to the summit, and over their tops the rude remain frowns grimly. Seen from a distance, it is not so striking, though hardly less singular. Then the high ridge of downs behind it comes into view, and lessens its importance; the magnitude of the hills causing the sturdy dark mass to dwindle almost into insignificance. But we will ascend the mound, and see what we can discover of the old castle. Little, indeed, is left to reward us, yet enough to trace out something of its extent and general plan. Its area within the walls is 560 feet from south to north, and 280 from east to west. On the east side it was defended by a deep morass, and on the south-west and north by a vallum and deep ditch. Of the building, the keep alone retains anything like a relic of its ancient form, and it is grand in its ruin - the grandeur of rude magnitude. The keep was square; only one of its walls remains, and that is tolerably perfect, and of great thickness. Several fragments of the outer walls are scattered about, and they are also very thick. All are composed of flints and rubble. This keep is supposed to be Norman; but as a Bramber Castle is mentioned in 'Domesday,' there must unquestionably have been a castle here in Saxon times. The Saxon castle might have been strengthened by De Braose, a Norman follower of William, to whom it was given after the Conquest; and the keep was probably erected then—if indeed it be Norman. De Braose had above forty other manors in Sussex given to him at the same time. William de Braose, one of his descendants, was among the foremost and most powerful of the barons who opposed the tyrannical measures of John. That pusillanimous monarch, in consequence, endeavoured to seize him privately, but, being warned in time, he escaped with his family into Ireland. Here he carried on some negotiations with John, who, however, as soon as he saw them in his power, seized his wife and eldest son, and committed them close prisoners to Windsor Castle, where they both died—it is said of starvation. De Braose escaped to Paris, but did not long survive the murder of his wife and child. John gave his estates to the Duke of Cornwall, but after his death they were restored to a son of De Braose. Bramber Castle afterwards passed by marriage into the hands of the Howards.

If we had space, it would not be uninteresting to trace the history of Bramber Castle, though there is no very important event connected with it. Like most other castles, it was seized and held by the parliamentary troops; and during the time it was in their possession Charles II. passed through the town in disguise, the streets at the time being full of soldiers. After it came into the possession of the Howard family it was suffered to go to decay; and it has been said that its destruction was caused more by gunpowder, not employed in war, but to obtain the materials, than by time. Before quitting the mound, there is a point a little higher than that on which the castle stands that should be ascended. The view from it is a singularly fine one, reaching, in one direction, over the flat Weald to an immense distance, and along the downs far as the Devil's Dyke; and, in the other, away over the sea to the trembling verge of the horizon. In this direction we have a goodly stretch of land between us and the sea, the coast-line being broken by Old Shoreham and its newer namesake, and the mid-distance dotted with two or three tiny villages; while the little borough of Bramber lies snugly below us, and the bare grey ruin is at our feet, with the ivy-covered tower of the church serving to unite the old keep with the town it overlooks. On the slope of the mound on which are the ruins of the castle, is Bramber Church, an old building, partly Norman; but it has been repaired and smartened of late, so as to look very different from what it did when we knew it ten or a dozen years ago. The renovations are not in keeping with the original: windows of quite a different kind have been inserted.

Bramber itself is a desolate-looking place—the very picture of a *rotten* borough. There is no trade, and the houses are in a tumbling-down condition. The old ones—and there were some good-looking ones some twenty years back—are all gone, or going; and in their stead miserable hovels are being erected. The whole place has a poverty-stricken air, which is not at all lessened by its displaying some faint traces of former superiority. Before the passing of the Reform Bill it returned two members to parliament, the number of voters being, we believe, somewhere about thirty. It was placed in schedule A, and all its little importance thereby destroyed. The property in the votes was pretty equally divided between the families of Lord Calthorp and the Duke of Rutland; and consequently there were sometimes some rather severe election contests, and not a few election petitions. At one election, in 1768, it is said that 1000*l.* were offered to a poor man for his vote, and refused. After this election, which was followed by a petition, a compromise was effected between the families, and, until the disfranchisement of the borough by the Reform Bill, each named a member. Wilberforce sat as member for Bramber during several parliaments, and there is an anecdote told of him in his Life, that travelling along here once, he called to the post-boy to inquire the name of the village they were passing through. "Bramber!" said Wilberforce; "why, that 's the place I am member for!" The Adur was once a much larger river than it now is; Camden says, "in foregoing times it was wont to carry ships with full sail as far as Brember."

A great charm in pedestrianism, as compared with any other mode of travelling, is the perfect independence of feeling it imparts. You may go where you please, or stay where you please. When the roads are dusty, you may turn to the lanes; when the fields and meadows become wearisome, you may betake yourself to the hills; you need never stay to inquire whether there is a carriage-way, and you can always make sure of a village inn at night. It is no doubt well in travelling to follow the route previously marked out, but not too servilely; many an unexpected tract of beauty or interest may open, and he is a dullard who will then hesitate to follow it, though at the expense of deranging a neatly contrived plan. We told our readers we should take them along the Adur and Arun, but we did not mean to go so far from home without a

digression. And now we intend to lead them a right pleasant ramble over the hills for a dozen miles or so. They who prefer it, however, may follow the river; from Bramber it runs nearly due south, widening as it goes, till, as it approaches Shoreham, it spreads, at every tide, over a large space; and the boggy soil on either side shows that it must once have been much wider. There is nothing calling for notice till it reaches Shoreham; it passes by St. Botolph's and Combe's, but there is nothing of consequence in them, and nothing about their little barn-like churches. Of Shoreham we shall have somewhat to say when we arrive there.

But turn your back to Bramber-street, and with us mount the hill that rises directly before you; there is an old road up one side of it, but we aim at the summit; it is a stiffish climb on a hot day—but onwards, another pull and we are at the top. There is something strangely refreshing in the breeze that comes over these South Downs from the sea. The whole man seems strengthened and exhilarated by it. The silence and the solitude too produce a feeling of elevation, almost of awe, in the mind—

"You feel for a time lifted above earth."

Then, what a noble sight is a fine range of downs stretching their long varying line far as the eye can reach! The downs are always beautiful;—whether thrown by the morning sun into bold and strikingly contrasted light and shadow; brightening in its mid-day blaze; melting under its softening influence as it sinks into the west; or when that mellow light is shed over them all that is seen just *after* the sun has sunk below the horizon; or again, when, on a clear summer's night, they are subjected to the magical power of a bright full moon: they are always beautiful. Ask Copley Fielding, who, with the eye and hand of genius, has seen and depicted them under such various aspects; and he, while confessing their beauty, will tell you that there are many phases of it that he could not hope to portray. We are not desiring to compare our South Downs with the mountains, but we may admire Spenser without disparagement to Shakspere. Well, we are on the hills, and now whither are we going? Onwards. That is Edburton church below us on the north; a pretty little structure in its way, with some carving about it we might look at if we were by it; you may see its curious leaden font figured in Dallaway's 'Rape of Bramber,' and the place described. But we are bound to the DEVIL'S DYKE; a favourite place of ours, we must even have a peep at it once again. See, in yonder 'coomb' beneath you is a little camp of gipsies, and a snug warm birth they have found for themselves. If we were Borrow, we might patter the crabbed *gitano* to them; but as we are not, we need not stay longer than to take a peep at their picturesque appearance as they are huddled there with their frail houses in that sheltered nook.

Well, here is the Dyke! Is it not a strange place? A long, narrow, and enormously deep cleft between two almost perpendicular hills; you hardly know what to liken it to, unless it be a Cyclopean railway-cutting. Antiquarians describe it (or rather the hill above it, for the dyke is the trough below) as a very large oval encampment, at least a mile in circumference, and only accessible by one narrow point of land which is defended by a very high bank and a broad ditch. They add that it was probably formed by the Romans, who took advantage of the natural shape of the hills, and then by their military skill brought it to its present state; and that it was no doubt one of the chain of forts that was carried along the summits of these downs. The fact of Roman coins having been found here leaves, they say, no doubt of its occupation by that people. This may be; but there is another story about its original formation. The people in the Weald below, it is said, were uncommonly pious, and had built so many churches and religious houses, that the Evil One looked on them with no good will. Finding that they continued to grow more devout, and turned a deaf ear to all his emissaries, he one night set boldly to work to scoop out a channel, so as to let in the sea and swamp them at once. But as it happened, an old woman in a cottage hard by, hearing an extraordinary scratching noise outside, seized her rushlight (for cotton-wicks were not in use then) and hobbled out to see what was the matter. The wicked one, mistaking her rushlight for the rising sun, and startled at its untimely appearance, took to his heels, and never came back to finish his malicious purpose. So runs one version, and something like it has appeared in print; but we must confess we do not entirely credit it. It does not appear quite feasible. The arch-fiend was, we all know, if saintly legends are to be believed, very often outwitted in olden times—and sometimes by tricks too shallow for the shallowest cockney of our day; still that he should have mistaken a rushlight for the rising sun is a little too much for our faith—and we are more inclined to adopt the story as we heard it when we were young, and used to wander at times hereabout. "When it happened was longer ago than I can tell," said our informant, "but as I heard it, I will tell it to you. There dwelt in the valley below a holy man, who had retired there from the wicked world, that in solitude, and away from the vanities and cares of life, he might pursue a course of austere self-denial, and practise without ostentation deeds of benevolence and mercy. His food was of the simplest herbs, his drink water from the little brook that ripples along the vale. But only on himself was his austerity expended; to every one else who sought him in their distress he was gentle, kind, and generous. The poor he relieved, the sick he healed, the miserable and the unfortunate he comforted. Long he lived there, and ever was the odour of his sanctity increasing: till at length the arch-enemy, who had tried as many means to pervert him as ever he expended on St Anthony, or St. Dunstan, or any other famous saint of those saintly times, determined to sweep him away by one grand manœuvre. For this purpose he resolved to cut a tunnel to the sea, and thus try on a large scale the saint's powers of floating. Having selected a dark night, he began his work in such earnest, that in a few minutes he had hollowed out as much as you see. But he was to meet with his match. At the moment he began to work, our holy personage had intimation of what was going on, and taking his lamp and his crucifix, he boldly sallied forth against the mighty one; and he prevailed. For no sooner did the wicked spirit see the holy man approach so armed, than he shouldered his spade and set off as fast as he could scamper; nor did he ever after venture near the valley, which in consequence flourished marvellously while the good saint lived. And ever since has this place been called the *Devil's Dyke*."

We do not vouch for the truth of this story, but there is the Dyke as a standing proof of its verity; and if that be not sufficient, there yet remains what ought to convince the most sceptical. For the Dyke is not the only scar left behind from that night's business. Some five or six hundred yards off are the prints of the fiend's feet, where in his hurry he trod on some boggy turf. There they are to this day, five or six steps, each a little bigger than those of an ordinary man (and, strange to say, they are none cloven, so that he must have worked in shoes), and there they are likely to remain until some scientific agriculturist is able to turn the ground to profit. The name of the holy man is irrecoverably lost, and—alas! for all sublunary fame

—his most famous deed is being transferred to an old woman and her rushlight.

However the Dyke may have been formed, it is a wild-looking place, and a wild place it is too for a night-ramble. Strange sights, we have been told, are seen here then, and we partly believe it: we have seen some ourselves. But we must away; not, however, without directing attention to the magnificent prospect from the summit of the Dyke—unequalled in its way in Sussex, perhaps in any of the surrounding counties. We shall not attempt to describe it; suffice it that we have directed our readers' attention to it. It is worth while to be here on a fine autumnal morning before sunrise, to see the mists pass away from over the Weald. Large woody tracts retain the moisture long after it has exhaled from the adjoining parts, and appear like wide and long lakes, giving a peculiar character to the scene. The sun rises over the hills, and often has a grand appearance:

"Full many a glorious morning have we seen
Flatter these mountain tops with sovereign eye,
Kissing with golden face the meadows green,
Gilding pale streams with heavenly alchemy."

There is a little inn at the top of the Dyke Hill—a windy situation: when there is no wind elsewhere in the county, they say you may find plenty there; and we have heard it whistle down those chimneys o'nights famously!—where the stranger may be accommodated with a bed on the sofa in the little parlour; and there is some convenience in that, for if he is bent on "preventing the sun rising," he may find it necessary—at least we have—to make his escape out of the window. The Dyke is much frequented by "gipsy-parties," of which Sussex folk are very fond. In our younger days we have been with more than one here, and it was a pleasant excuse to stay rather late, that we might in our way home hear the nightingales sing in a wood not many miles off; and where else do nightingales sing as they do in Sussex?——But we must leave this place; and we shall have a grand walk over the downs to Shoreham.

REFLECTORS FOR TELESCOPES.

The principles on which the construction of telescopes rests, and the practical application of such instruments to matters of science, involve details rather beyond the general scope of these pages; but the formation of the *reflectors* or *specula* is rather a curious subject, and at the same time one that admits of being described in general terms.

There are, among all such instruments as telescopes and microscopes, two varieties, which are separated one from another in a marked manner. In one variety there is a *lens* of glass, through which rays of light pass; in the other there is a polished or opaque *mirror*, *reflector*, or *speculum*, from the surface of which rays of light are reflected: the former obtain the name of *refracting* telescopes or microscopes; while the latter are *reflecting*. What is meant by a lens, every one who has looked through a pair of spectacles, or an opera-glass, or an eye-glass can very well determine; for whether these several pieces of glass be convex or concave, they still obtain the designation of lenses, the form of the curve being regulated according to the purpose to which the lens is to be applied. But the reflectors employed for optical instruments are not so familiarly known, and the precautions necessary to their production are but little suspected, except by those practically concerned.

All the polished reflectors employed for these purposes are either convex or concave, generally the latter. Sometimes the ornamental glass mirrors of a room are convex, and more rarely concave; but such as these are wholly unfitted for the exactness required in optical investigations. There is, in the first place, a double reflection, one from the glass itself, and one from the mercury at the back of it; and the form of the curve is not such as is here indispensable. The reflectors are therefore made of some other substance; and an alloy of metals has been found the best fitted for this purpose. To discover what is the most favourable alloy has been a subject of some difficulty; density of substance, smoothness of surface, whiteness of colour, brilliancy of polish—all are requisite to the production of a good reflector. About sixty years ago, the Rev. Mr. Edwards made more than seventy mixtures of different kinds of metals, to determine which was best fitted for specula. The metals he employed were silver, platina, iron, copper, brass, lead, tin, antimony, arsenic, bismuth, and zinc; two or more of which he combined in various proportions, and tried what kind of surface each mixture would produce when polished. Some were too soft, some too blue, some too yellow, some too rough. Among the whole number he found that "the whitest, hardest, and most reflective" mixture he met with was formed of thirty-two parts copper, fifteen tin, one brass, one silver, and one arsenic. This mixture differed very little indeed from that which Sir Isaac Newton had adopted a century before for his reflecting telescope; and to the present day the mixtures employed bear a close analogy to the above; copper and tin, in the proportion of about two to one, being the main and sometimes the only ingredients.

The processes of casting and polishing the specula for large telescopes are such as call for great nicety and care. All the accounts which have been published of the construction of large instruments corroborate this, and show how much inventive power on the part of the constructors was required. Sir William Herschel's forty-feet telescope was the final result of a long series of experiments on this as well as on other parts of telescope-making. In the account of his labours which he communicated to the Royal Society he said, "When I resided at Bath, I had long been acquainted with the theory of optics and mechanics, and wanted only that experience which is so necessary in the practical part of these sciences. This I acquired by degrees at that place, where, in my leisure hours, by way of amusement, I made for myself several two-feet, five-feet, seven-feet, ten-feet, and twenty-feet Newtonian telescopes; besides others of the Gregorian form, of eight inches, twelve inches, two feet, three feet, five feet, and ten feet focal length. My way of doing these instruments at that time, when the direct method of giving the figure of any of the conic sections to specula was still unknown to me, was to have many mirrors of each sort cast, and to finish them all as well as I could; then to select by trial the best of them, which I preserved; the rest were put by to be repolished. In this manner I made not less than two hundred seven-feet, a hundred and fifty ten-feet, and about eighty twenty-feet mirrors."

It was in this way that Herschel qualified himself for the construction of his gigantic telescope, which, until recently, was the largest in existence. It was immediately preceded by one having a reflector or speculum thirty-six inches in diameter: in making this speculum, the composition of the metal was of too brittle a nature, and the speculum cracked in cooling; it was cast a second time, but the furnace gave way under the weight, and the melted metal ran into the fire. Gaining experience from multitude of trials, many of which were failures, he at length formed his great speculum, with which he made such important astronomical discoveries. The metal of this speculum was about fifty inches in diameter, but the portion

which was polished and applied to use measured forty-eight inches across. The metal was three inches and a half in thickness in every part; and its weight, when it came from the casting, was somewhat over two thousand pounds.

But the speculum recently made by the Earl of Rosse exceeds everything else of the kind in magnitude. Its construction cost months of operation, and probably years of thought. Almost every part of the apparatus necessary to its construction was invented or adapted by the earl himself; since, in respect both to the casting and the polishing, all the arrangements adopted on previous occasions were on far too miniature a scale for this.

Sir James South communicated to the 'Times' newspaper, in April, 1843, an account of the casting of this memorable speculum, from which we cannot do better than abstract a few details to illustrate this subject. A furnace and casting-house were built expressly by the earl at his seat (Birr Castle) in Ireland; and Sir James South adopted the following curious mode of conveying to the mind an idea of the furnace and its arrangements:—"Make one extremity of a line 4½ inches long, and bisect a perpendicular to itself of 2½ inches long, and at the other extremity of it bisect another perpendicular to itself of 2⅛ inches; beyond which perpendicular extend the first-named line 2½ inches. Call the first the *crane* line; the second, the *chimney* line; and the third, the *mould* line. On the crane line, at the distances from the chimney line of 1⅞, 2⅛, and 3⅛ inches, make dots; on the first of these dots place centrally a silver fourpence; on the second, a silver penny; on the third, a sixpence; on the centre of the chimney line, a shilling; on each of its extreme points, a silver fourpence; on the centre of the mould line, a crown; on each of its extreme points, a sixpence; and on the uncovered extremity of the crane line, a card of two inches square, so that its sides shall be either parallel with or perpendicular to the crane line. Now, supposing these several coins and card to have the same thickness as the silver fourpences, the *tout ensemble* will indicate an horizontal section of the foundry; for the three fourpences will represent the crucibles in their furnaces, the shilling the chimney, the penny the crane, the crown the bottom of the mould, the sixpences the iron pouring-baskets, and the card the floor of the annealing-oven."

All the implements were on a large scale. The three furnaces were each nearly six feet square, eight feet high, and built of brick. The crucibles (one in each furnace) were cast-iron vessels, two feet in diameter by thirty inches deep, each weighing about half a ton. The pouring-baskets were of iron, with long handles projecting from one side. The mould was formed of iron hoops, laid closely one within another, with their edges upmost; and these edges were all turned in a lathe, so as to give a general convexity to the whole assemblage corresponding to the intended concavity of the speculum. On this bed a mould of sand was formed to the exact size required.

Thus much for the working apparatus. The ingredients employed were copper and tin only, in the proportion of rather more than two of the former to one of the latter. When all the arrangements were ready, the furnace-fires were lighted; and the crucibles being brought to a proper heat, the metal (which had been fused and broken up, and of which the copper consisted of old copper sheathing) was distributed equally in the three crucibles. In nine hours from this time the metal was thoroughly melted and ready for the casting. Tackle from the crane drew each crucible out of its furnace, and deposited it in its iron basket. The three baskets were near the mould, and at a given signal all of them were tilted up, and the ponderous contents poured into the mould. In about twenty minutes, when the metal had solidified, an iron ring was clamped round the speculum, and the latter was hauled along an iron railway from the mould to the annealing-oven. This oven, which had been kept at a dull red heat for several days, was now charged with charcoal, the arches below were supplied with turf, and every opening of the oven was built up and plastered over. Here the oven and its contents were allowed to remain untouched for sixteen weeks, during which the heat died gradually away—this gradual cooling being one of the conditions by which annealing is effected, or, rather, it is *the* condition.

The casting was quite successful. The gigantic speculum thus produced was six feet in diameter, five inches thick at the centre, five and a half at the edges, and weighed more than six thousand pounds. The reflecting surface of Herschel's speculum, large as it was, was less than half that of the speculum here described.

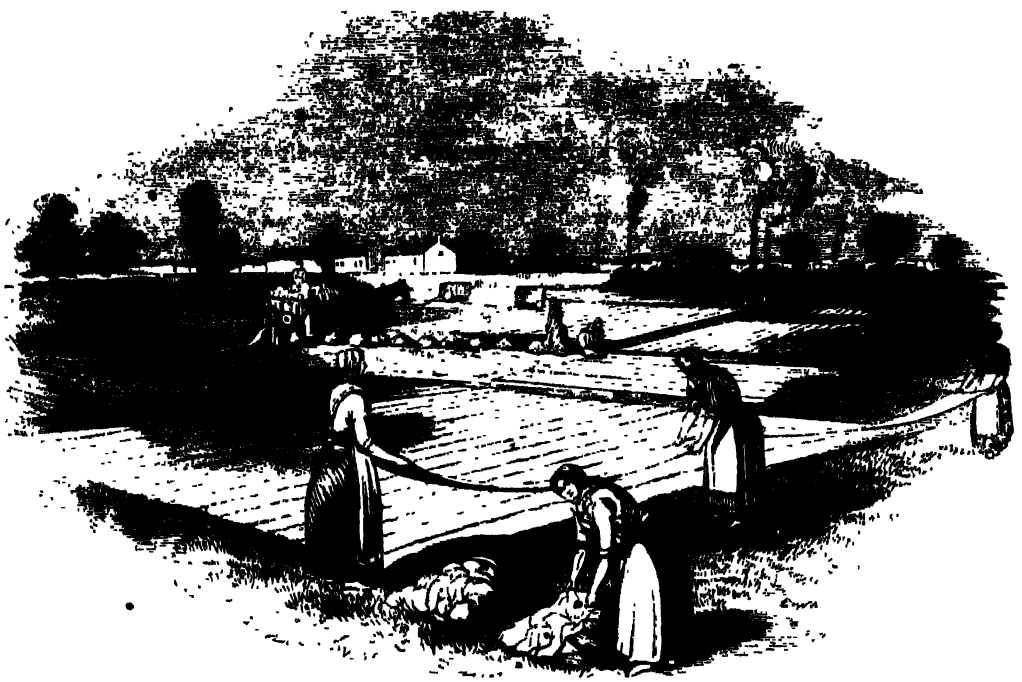
It will be at once obvious that the surface produced by this mode of casting must require much grinding and polishing to give it the requisite brilliancy. The Earl of Rosse had to devise new modes for working his enormous speculum; but the customary mode is somewhat as follows:—A convex elliptical surface of lead and tin is formed; on this is sprinkled fine emery powder; and the speculum is worked over and over on this roughened surface, sometimes with long strokes and sometimes in circles. By this means the roughnesses of the surface are gradually worn away, and the concavity of the speculum assumes a spherical form. Sometimes convex brass tools, and sometimes a convex tool of common blue bones, are used to facilitate the grinding. When the surface is thus worked down to a fine level, it undergoes a polishing process. A convex tool is coated with a thin layer of black pitch, and with a little colcothar, or calcined vitriol; and the speculum, being inverted over this tool or polisher, is worked for a long period in various directions, until a brilliant and equable polish appears in every part. The shape given to the polisher is such that the final curve of the polished surface of the speculum is not really spherical, but slightly deviates from it, in accordance with certain optical laws required in reflecting instruments.

The Earl of Rosse so far deviated from the usual plan as to place the polisher over the speculum, instead of the speculum over the polisher. The speculum was made to rotate in a cistern of water, whereby its temperature was maintained constant during the polishing; it was moved by a steam-engine, as was likewise the polisher. Many interesting details were given respecting the polishing of this mighty speculum at the last meeting of the British Association; and we may look forward to important astronomical results from its use.

It remains only to say, that such specula as these are placed at the *bottom* of the tube of the telescope; the upper end of the tube being directed upwards towards the sky, and the light of the star or other heavenly body being reflected from the concave surface of the speculum. The observer views this reflected image by means of an eye-piece or lens, adjusted in different parts of the tube according to the kind of telescope.

It will thus be seen that the formation of the speculum of a large telescope involves vast complexity and delicacy of arrangement; and it will perhaps excite surprise in the minds of many, that these specula are made of metal differing but little from that of bronze statues, of bells, and of guns—copper being in all four the chief ingredient, and tin the next, if not the only other.

A DAY AT THE BARROWFIELD DYE-WORKS, GLASGOW.



[Bleaching-Ground—Monteith's Dye-Works, Glasgow.]

Were it not that the subject of calico-printing has already occupied our attention in the 'Supplement' for June, 1843, the fine establishment of Messrs. Monteith, at Glasgow, would afford ample opportunity for illustrating many varieties of that beautiful process; but as the differences observable in such establishments, although very marked in the eyes of a manufacturer, are of no moment to those who wish merely to gain a slight insight into the general processes, we shall dispense with any further notice of calico-printing in general. There are, however, two beautiful processes which stand out somewhat distinctly from calico-printing in general, and for which the Barrowfield Works of the above-named firm have acquired a very wide celebrity, viz. *Turkey-red Dyeing* and *Bandana Handkerchief* work: these processes, through the courtesy of the proprietors, we have been allowed to witness; and it is the object of the present article to describe them, as well as the general arrangement of the Works wherein they are conducted.

The Barrowfield Works occupy a very large area of ground at the eastern margin of Glasgow, bordered by the Clyde on one side, and by the excellent "Green" of Glasgow on another. The Londoners might well envy the Glasgow folks the possession of such a Green, for it is an invaluable agent in maintaining the health of the city. It consists of a large park or green, comprising one hundred and forty acres, having the river flowing along one margin, a series of houses along the opposite margin, Hutcheson Bridge at one end, and Rutherglen Bridge at the other. The inhabitants, aided zealously by Dr. Cleland, have successfully resisted all attempts to have this Green built upon; and there it remains, the property of all, with a few clusters of trees here and there, seats for the wearied, gravel walks for the ramblers, and a soft green carpet of sward on which the bare-legged damsels lay out their washed linen to dry,—for it is also a drying-ground open to all the laundresses who choose to avail themselves of it. Amid the smoke and bustle of iron-works, chemical-works, dye-works, cotton-mills, and engine-factories, it is no trifling advantage to have such an open spot.

Having walked across this "Green," then, to its eastern end (and it is a good thing that many of the workmen have to cross this Green on their way to work), we arrive at the gates of the Works, within which is large area of ground occupied partly by buildings, partly by yards and drying-grounds, and partly by green sward as a bleaching-ground. The buildings are in detached groups, and many of them are very large; some being used for dyeing cotton-cloth, some for Turkey-red yarn-dyeing, and others for bandana-work, printing, stoving, and a variety of other processes. The drying-grounds have ranges of poles on which yarn is hung to dry; while the extensive bleach-field requires nothing but a smooth, clean, grassy surface. It may be well at once to remark that this bleach-ground is appropriated wholly to certain stages of the Turkey-red dyeing, and does not relate to

bleaching as commonly understood,—chloride of lime having wholly subverted the ancient mode of conducting such bleaching. Those portions of the establishment which are connected with the general processes of printing on calico we shall pass over for reasons just stated, and shall proceed at once to

Turkey-red Dyeing.—Most persons are familiar with the tint of red known as 'Turkey-red;' but few would imagine how many have been the experiments as to the best mode of producing it, or the multiplicity of the distinct processes involved in the production. The vegetable substance called *madder* produces a red which is much employed under the name of 'common madder red;' but the '*Turkey-red*,' although produced likewise from madder, is infinitely more brilliant and beautiful, and requires great complexity of operations. The production of this fine colour was first known in India, from whence it travelled to the western part of Asia, and thence to Greece and Turkey. Just about a century ago, two French manufacturers brought some Greek dyers into France, and with their aid established Turkey-red Dye-Works at Rouen and in Languedoc. Mr. Wilson of Ainsworth, near Manchester, endeavoured, about the year 1770, to introduce this mode of dyeing into England; but for some reason or other it does not appear to have succeeded at that time. Some years afterwards a French gentleman, M. Papillon, joined Mr. Mackintosh in the establishment of a Turkey-red Dye-Work at Glasgow. There was an agreement entered into between these gentlemen and the Commissioners and Trustees for Manufactures in Scotland, to the effect that the Turkey-red dye process, at that time a secret in few hands, was to be published for the benefit of the public at the end of a certain term of years. This period expired in 1803; and the trustees then laid a minute account of the different processes before the public. Glasgow, however, having been the first to witness the successful prosecution of the process, continued to maintain its supremacy in that matter, and has ever since been the head-quarters in Britain for this art. Dr. Thomson has observed that "different individuals, possessed of both chemical skill and considerable sagacity, have studied the different parts of this very complicated method of dyeing. The effects of each individual operation have been carefully investigated, and the whole has been somewhat shortened and simplified, though it still constitutes the most complicated process in the whole art of dyeing." The red dye was at first given only to the spun yarn; but among the subsequent improvements was that of dyeing the woven cotton itself. We may here remark, that M. Papillon, when he introduced the practice of this art at Glasgow, occupied that part of the Barrowfield Works now appropriated to the yarn-dyeing.

Let us suppose that a quantity of cotton-cloth reaches the Works just in the state that it leaves the loom; that is, technically speaking, 'in the grey.' The first process it undergoes is to plunge it in what is termed a *rot-steep;* this is a very hot alkaline liquor, the continued action of which on the cloth for many hours removes the 'dressing' of paste or size which the yarn had received before weaving, and which, if not removed, would prevent the fibres from imbibing the dye. The cloth having by this process become saturated with alkaline liquor, which must likewise be removed, it is conveyed to a long washing-house containing a large number of 'dash-wheels,' similar to those which were sketched and described in the 'Supplement' before alluded to. Into these dash-wheels the cloth is introduced, and there rotated with water till cleansed from the alkaline liquor and the dressing. But as the fibres have become saturated with water during this washing, and as this water must be removed, the cloth is exposed to the action of a powerful Bramah press, by which a force of five hundred tons is brought to bear upon it, so as to press out the water.

Then ensues a remarkable series of processes, in which almost every one operation is repeated a great number of times, adding considerably to the complexity of the routine. The cloth is put into what is termed a 'vomiting-boiler,' that is, a boiler so constructed that the water is made to vomit upwards from a pipe, and then to fall down on the cloth in the boiler, so as to act equally on the whole. The boiler contains a solution of soap and soda, which is allowed to act on the cloth for some hours, so as to prepare the fibres for the reception of liquids afterwards to be applied. From the vomiting-boilers the cloth is conveyed a second time to the wash-wheels, there to be washed clean from the soap and soda, and then a second time to the press, where it is squeezed almost dry. This repeated transfer of the cloth from one vessel to another, and from one part of the building to another, gives employment to a great number of men, who are running to and fro in all directions, wheeling barrows or hand-trucks containing the cloth.

After the second washing and squeezing, the cloth is taken to a drying-stove, a room heated to a temperature of about 140°, and provided with bars and pegs on which the cloth is hung by the selvage till dry. Then, being made up into convenient bundles, it is taken by the hand-carts to a building where that series of processes is conducted which forms, perhaps, the most distinguishing feature in Turkey-red dyeing, and on which the beauty of the dye mainly depends. A vessel is supplied with a solution containing Gallipoli oil and some alkalies, which form a kind of soap, together with a third substance, more useful than agreeable, to give an 'animalizing' power to the action of the solution. It is well known that silk and wool (both animal fibres) receive in general much more brilliant dyes than cotton or linen (vegetable fibres,); and the present process is to impart to the cotton fibres a quality somewhat analogous to that of wool and silk. Two rollers dip into the trough, containing this solution, and the cloth is drawn through the solution between the rollers, by which it becomes saturated.

Then ensues that part of the process wherein the bleach-field is brought into requisition. The cloth, which has acquired a yellowish tinge from the solution, is wheeled from the building to the open air, where it is consigned to the care of a number of women. The cloth is in pieces of 28 yards each, and these pieces are laid down flat on the grass, side by side. If the weather be favourable, an exposure for two or three hours to the action of air produces the effect desired, which seems to be a kind of oxidation. All is bustle in the bleach-field when rain threatens: the women, with handkerchiefs on their heads, but nothing on the feet, hasten to gather up the cloth; and even if the weather be fine there is constant employment for them, since one batch of cloth is laid down as soon as another is removed. Sometimes as much as five thousand pieces, or a hundred and forty thousand yards, are lying on the field at one time.

The cloth is subjected a second time to the solution; then a second time spread out on the grass, in the same way as before. A different solution is next employed, containing only the oil and alkali; and this is applied three or four times in the same way as before, the cloth being 'grassed' after each application, and stove-dried after each immersion in liquor and after each grassing; so that the transfers to and fro become very numerous, and show how much time and assiduity are

bestowed upon those processes. When the last of this recurring series is completed, the cloth is steeped for some hours in an alkali bath; and then, after being washed in the dash-wheel and squeezed in the press, it is drawn between rollers in a tub containing a solution of sumach (a substance much used in tanning thin leather, and in other processes where a binding quality is required). After being dried, it is passed through a solution of alum; so that by this time the cloth has been exposed to the action of oil, alkali, sumach, and alum, all of which contribute to the permanence and beauty of the dye afterwards to be applied.

The dye-house is a long building, containing a range of dye-vats, with horizontal shafts or frames worked by steam-power. The cloth is placed over these frames, and allowed to hang down into the dye-liquor, so that by rotating the frame, every part of the cloth becomes exposed equally to the action of the dye. The principal ingredients in the dye are madder and bullock's blood, mixed in such proportions, and heated to such a temperature, as are found best suited to the object in view. The alum, previously applied, causes the dye to adhere to the cloth, and the depth of tint greatly depends on the amount of alum combined; while the other preparatory ingredients aid in giving brilliancy to the dye. When the cloth has imbibed sufficient of the dye, it is washed in the dash-wheels, and then boiled for eight or ten hours in an alkaline liquor, by which the colour is greatly heightened, or 'cleared.' Another washing, another boiling, a third washing, and a final 'clearing' in a solution of chlorine, terminate this very long and complex series of operations.

Most of the processes here noted (except perhaps the grassing) are analogous to others that occur in dyeing generally; but it is the great number of them, and the nicety required in their management, which constitute the remarkable features in Turkey-red dyeing.

The cloth, when thus dyed, is ready for any further process, either to be printed for dresses, shawls, or handkerchiefs, or to go through that peculiar train of processes which constitutes bandana-work. But besides the cloth thus dyed, a vast quantity of cotton yarn is similarly dyed, to be employed afterwards by the weavers in this country, or for exportation to foreign parts. The general train of processes is similar in the two cases, with some minor exceptions, and the annexed cut shows the mode of effecting a process which is many times repeated in the course of the dyeing, viz. wringing the hanks of yarn after being immersed in liquids. The yarn-dyeing is carried on wholly in a separate set of buildings, with boilers, vats, troughs, &c. independent of those employed for the cloth dyeing; and instead of laying the hanks of yarn down upon the grass, they are hung upon short tin tubes, which tubes are rested on bars in the drying-ground.



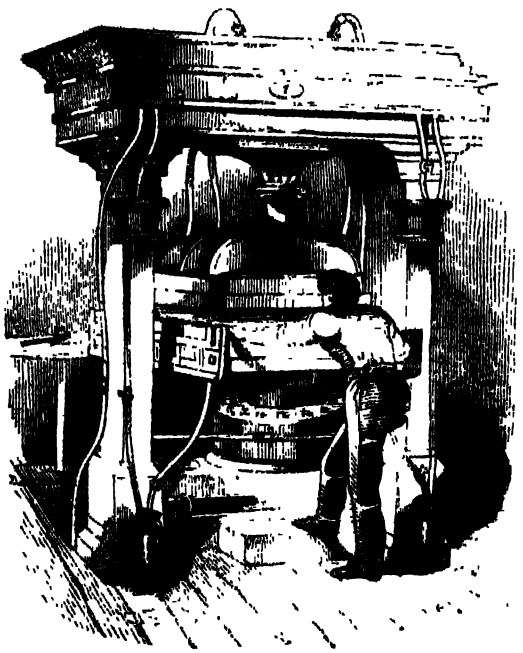
[Yarn-wringing.]

Bandana Handkerchiefs.—Most persons probably know that particular style of pocket-handkerchief which obtains the name of *bandana* or *bandanna*. The term is an Indian one, and was applied by the natives of India, who first produced this kind of pattern, though in a manner very different from that followed in this country. The characteristics of a bandana handkerchief are these:—a uniformly dyed ground of red, blue, or purple; with groups of yellow or white spots. The durability of the colours was the quality which brought those handkerchiefs into favour; and for many years the British manufacturers failed in producing a good imitation. The Indians are said to adopt the following very rude and simple mode of procedure:—After having dyed the cloth, they tie up with bits of thread those small parts which are to remain white or yellow; while the rest of the surface is freely exposed to the operation of the dye. Whether this is or is not a correct description of the Indian process, it is certain that the first British 'bandanas' were a poor imitation of those from the East. The first mode of accomplishing this was by the ordinary process of calico-printing upon white cloth. But in this mode it was rarely if ever in the power of the manufacturer to render the colours sufficiently durable, especially the red; and therefore the home-made article was never held in estimation by purchasers, most of whom consisted of that class of persons to whom durability was a great requisite. There was also a tax which at that time pressed heavily on printed cottons. These two circumstances led to the adoption of a felicitously conceived plan for producing the effect by totally different means. It was, we believe, M. Kœchlin, of Mülhausen, who, in 1810, discovered a mode of effecting this by the use of the chloride of lime; and in a few years afterwards, the 'Bandana-gallery' at Messrs. Monteith's Works became one of the most celebrated manufacturing apartments in the kingdom, in reference to the use of this powerful chemical agent in the production of handkerchiefs, which now far excel their Indian prototypes.

To understand the mode of proceeding, it will be well to premise that the handkerchief, shawl, or piece of cloth, is dyed uniformly of one colour in every part, both surfaces being equally impregnated with the colour; and that the white spots have the colour completely removed from them by the action of chloride of lime. The operations therefore resolve themselves into two parts—the dyeing of the cloth, and the discharging of the colour. Generally speaking these bandana-handkerchiefs are either red or blue: if the former, they are prepared by the Turkey-red dye processes just described; if blue, they are dyed with indigo in the usual manner. We will therefore suppose the dyeing to be completed, and the subsequent processes about to commence.

The Bandana-gallery at the Barrowfield Works is a room about one hundred feet in length, exhibiting through its centre a range of sixteen discharging-presses, where the chemical action of the chloride of lime is exerted. These presses are about six or seven

feet high, by four or five square; and have behind each of them a roller on which the dyed cloth is wound, and in front another which receives the cloth after the discharge. At one end of the gallery there is kind of clock or dial, having a moveable index or hand, and certain figures round the edge. An inquiry into the object of this dial affords us the means of seeing with what admirable simplicity mechanical power is brought to the aid of chemical power in these operations. Each of the presses, such as the one here sketched, is a



[Bandana Press.]

hydraulic press, in which a bed-plate is forced upwards with a power all but irresistible. The man who attends each press can turn on or off this power with the utmost ease, by placing his machine into or out of connection with the hydraulic engine where the force is generated. All the presses are alike connected with this engine, which is outside the gallery; and the dial indicates the force of pressure at any particular moment, by which the workmen are guided in their proceedings.

We will suppose that several pieces of red cloth for handkerchiefs are to have groups of circular white spots, such as are so frequently exhibited by banana-handkerchiefs. Fourteen pieces are laid flat and smooth one on another, as even and regular as possible. This compound piece is wound on the roller at the back of one of the presses; and a portion about a yard square, being unwound, is laid flat on a horizontal slab or bed in the machine. Then the workman, by turning a handle, brings the pressure to act from the hydraulic machine, and we see the bed-plate rise slowly till the cloth comes into contact with an upper horizontal plate; and such is the power of the machine that the cloth is pressed between the two plates with a pressure of, we believe, from two to three hundred tons. Then the workman pours some liquor into a cell or trough above the upper plate; and after allowing it to remain a short time, first draws off the liquor by a small cock, and then removes the pressure, whereby the lower plate is made to sink. On now removing the cloth from the press we see—and a stranger can scarcely see it without astonishment—that the red surface of the cloth is diversified with groups of white spots; nay more, that every one of the fourteen pieces is similarly affected, whether lying at the top, the bottom, or the middle of the heap. The red-dye that would have withstood all the wear and tear of ordinary usage and washing, is seen to be completely removed from the spots, leaving them quite white.

We naturally look to the horizontal plates, to see how the liquid is enabled to act upon the cloth. Both plates are made of lead, about half an inch in thickness, and both are perforated exactly in the same way, and with holes of the same size as the spots to be produced on the cloth. The fourteen thicknesses of cloth have thus a perforated plate above them and another below, so that any liquid which may be poured on the upper plate can percolate through the holes, then through the fourteen thicknesses of cloth, and lastly through the holes in the lower plate. But it is easy to conceive that unless the cloth were pressed very tightly between the plates, some of the liquid would spread laterally beyond the margins of the holes; and it is to prevent this that the immense pressure is exerted. The liquid, which is a solution of 'bleaching-powder,' or chloride of lime, being poured on the upper surface of the upper plate, is allowed to remain there a few minutes, during which time it acts on the fourteen thicknesses of cloth at the places where the holes in the plates occur; but the intense pressure prevents it from spreading laterally to other parts of the cloth. Chloride of lime has the property of removing colours: and this it does so speedily, that in about ten or fifteen minutes all the fourteen thicknesses of cloth are acted on. When one portion of the compound piece of cloth is thus finished, it is wound on the front roller, and another equal portion is unwound from the back roller, to be treated in a similar manner. All the presses have equal power, so that in twelve hours the whole series can discharge an enormous length of cloth, by the aid of four or five men only: for while one press is remaining still and in work, the man who attends it can go and supply other presses with their working materials.

Sometimes the spots on a blue or red bandana handkerchief are yellow, instead of white. In this case the chloride of lime is still the active agent by which the ground-colour is removed, but other arrangements are made whereby a chemical production of colour results. Two liquids are, in such an instance, poured on the upper plate: the one being a solution of chloride of lime, to abstract the ground-colour from the cloth; and the other some chemical agent which shall give a yellow colour to the white spots thus produced: or perhaps it may be that the white spots are not actually produced at all; that the ground-colour, the colouring-agent, and the chloride, all act simultaneously in the production of yellow spots at the part of the cloth not protected by the plates.

In other instances, again, there are both white and yellow spots combined in the same piece of cloth. This arrangement requires the use of very ingeniously constructed plates. There is, in the first place, in each plate, one series of holes for white spots and another series for the yellow, and then an adjustment so that there shall be no channels of communication whatever between the one series and the other. By certain little ridges and dividing edges, all the holes of one series are brought into connection with a cell into which one kind of liquid is poured, while those of the other series are similarly placed in communication with another cell. Into one cell is poured the simple solution which is to produce the white spots; into the other the combined liquid for producing the yellow spots: and the two liquids percolate through the cloth

independent of each other, each one working its own effect in its own peculiar way. In like manner the lower plate is so partitioned off as to afford separate egress to the two kinds of liquid.

The preparation of these plates is an important point in the series of operations. In one part of the Works is an apartment where the plates are wrought. The lead, cast for the purpose, is brought to as flat and smooth a surface as possible, and on each piece is drawn or sketched the positions of the various holes, correspondent to the spots in the pattern. With appropriate tools, fitted for working in lead, the holes are then cut out completely through the lead; and various little channels are made in that one which is to be the lower plate, as a means of carrying off the liquid when it has effected its work. The holes in the upper plate are made to correspond strictly to those in the lower, whether the pattern is simply a group of spots, or whether it has a border. The nature of the process, it is easy to see, is inconsistent with the production of any fine or delicate lines in the pattern; and therefore very little more is attempted than the production of spots and lines or bold scrolls. The stock of plates forms both a ponderous and expensive item in the Works; for each pair—that is, the two for each pattern—weigh about six hundred pounds; and as every new pattern requires a new pair of plates, there is a constant addition being made to these very weighty working materials, especially as the old ones are not melted up so long as there is a chance of using them again.

Many of the handkerchief and shawl pieces are treated in a mode somewhat midway between the usual process of calico-printing and that of bandana-work, or indeed combining something of the two. For instance, a piece of cloth being dyed some uniform colour, and then *printed* in certain parts with a chemical agent, is dipped into a vat of bleaching-liquid, which either instantly discharges the colour from the printed parts, or gives to them a wholly new colour, in either case imparting a pattern. This process is well calculated to surprise a spectator, for the printed part is almost wholly invisible until dipped into the discharging-vat; and hence what appears to be a piece of plain red or blue cloth comes out of the vat with a beautiful white or yellow pattern upon it. The writer has now before him a small piece of Turkey-red dyed cotton which he saw go through the following processes in the course of a few minutes:——A pattern was printed on one part with tartaric acid and nitrate of lead; another pattern was printed on another part with tartaric acid alone; a third pattern was printed on a third part with tartaric acid and Prussian blue: the cloth was then dipped into a chloride solution, by which the first printed portion became white; and then into a solution of bi-chromate of potash, by which the other printed portions became yellow and blue respectively:—thus exhibiting a very remarkable series of chemical actions among the substances employed.

As regards the *patterns* of handkerchiefs and similar articles of cotton, a glance round the warehouses of such an establishment as the one we have been describing will afford us some curious items of information. At the warehouses of Messrs. Monteith, in the heart of Glasgow, the first thing which strikes the eye is a very blaze of Turkey-red (if we may use such a term): on every side shelves, presses, and counters, in long ranges of rooms, are loaded with cotton goods, principally handkerchiefs and shawls, and all more or less exhibiting Turkey-red as the chief colour; for though all colours are employed, yet this one is the characteristic of the place, and gives a hue to the whole assemblage of goods. A little closer glance shows that the goods about to be exported to any particular country have a character about them different from those destined to other countries. This is a very curious point, and is exemplified on a large scale at this warehouse. The patterns for the home-market are generally unmeaning, representing objects which never have existed and never will; curves, zig-zags, stripes, spots, all imaginable shapes, are combined together into patterns, which are pleasing, perhaps, to the eye, but have no definite meaning. The Chinese market, on the other hand, requires patterns in which natural objects, such as birds and flowers, are depicted. The South American States demand the most gorgeous mixture of colours which the dyer and the printer can give; large masses of bright red, blue, and yellow—without any particular reference to the pattern—are called for. For the German market, pictorial subjects are prepared, without much reference to brilliancy of colours; copies from celebrated works of art by Overbeck, Cornelius, and other artists; and from pictures in the gallery of the Pinacothek at Munich, together with representations of cathedrals, abbeys, castles, and public buildings generally—were among the subjects which we saw represented on large bales of handkerchiefs for the German market.—In this way a sixpenny pocket-handkerchief may, if we choose to study it rightly, be made the means of giving us a little insight into national character and taste.

This will be a fitting opportunity to group together a few facts relating to the finishing, or what we may perhaps term the decorative departments of the cotton manufacture: first, in respect to the dyeing and printing in other countries; and secondly, in respect to the embroidering, or decoration by means of the needle.

The Hindoos had the skill of imparting bright colours and a glossy surface to their cottons in times when we knew very little even of the substance itself. Whether colours were given or not to the exquisitely fine muslins of India, or were confined to goods of coarser texture, it is certain that both the fineness and the beauty of colour were in early times regarded with mingled astonishment and admiration. Tavernier, when speaking of the calicuts or calicoes made at Calicut in India (whence they were named), said—"The white calicuts are woven in several places in Bengal and Mogulistan, and are carried to Ranoxsary and Baroche to be whitened, because of the large meadows and plenty of lemons that grow thereabouts, for they are never so white as they should be till they are dipped in lemon-water. Some calicuts are made so fine, you can hardly feel them in your hand, and the thread when spun is scarcely discernible." He also says that some of the calico is so fine that when a man puts on a garment made of it, "his skin shall appear as plainly through it as if he was quite naked." Various other modes were adopted, and have been adopted by later writers, to express the exquisite fineness of the Hindoo muslin. One states that "twenty-five ells of it put into a turban will not weigh four ounces." Mr. Ward says, "Muslins are made so exceedingly fine that four months are required to weave one piece, which sells at four or five hundred rupees. When this muslin is laid on the grass, and the dew has fallen on it, it is no longer discernible." Sir Joseph Banks described some Hindoo home-spun cotton yarn, of which one pound measured a hundred and fifteen miles in length. The late Mr. Mill thus accounted for the extraordinary skill of the Hindoos in these matters:—"It is

a sedentary occupation, and thus in harmony with his predominant inclination. It requires patience, of which he has an inexhaustible fund. It requires little bodily exertion, of which he is always exceedingly sparing; and the finer the production the more slender the force which he is called upon to apply. But this is not all. The weak and delicate frame of the Hindoo is accompanied with an acuteness of external sense, particularly of touch, which is altogether unrivalled; and the flexibility of his fingers is equally remarkable."

The dyeing and beautifying of the woven cottons were equally objects of attention with the Hindoos. One of the early Portuguese adventurers speaks with admiration of the "painted" cottons produced by the Hindoos; and there are other writers who speak similarly of *painted* colours, the true character of which was not at that time understood. Thus, a Venetian merchant who travelled in India about 1560, speaks of the cotton-cloth "painted, which is a rare thing, because this kind of cloths shew us they were gilded with divers colours, and the more they be washed the livelier the colour will show." There was also a species of chintz then made, and extensively purchased in Europe; for in a pamphlet published in 1678, called 'The ancient Trades decayed and repaired again,' is the following complaint on the part of the woollen manufacturers:—"This trade is very much hindered by our own people, who do wear many foreign commodities instead of our own, as may be instanced in many particulars, viz. instead of green say, that was wont to be used for children's frocks, is now used *painted* and *Indian-stained* and striped calico; and instead of a perpetuana or shalloon to lyne men's coats with, is used sometimes a glazened calico." Defoe, too, said that "the general fansie of the people runs upon East India goods to that degree, that the *chintz* and painted *calicoes*, which before were only made use of for carpets, quilts, &c., and to clothe children and ordinary people, became now the dress of our ladies."

But the most curious account of the dyeing processes adopted by the Hindoos was that given by Father Cœurdoux, a missionary at Pondicherry. From this account it appears that the Indian cotton-cloths, when brought from the loom, were worn next to the skin by the dyer and his family, during a space of eight or ten days; after which they underwent several soakings in water with goats' dung, accompanied with frequent intermediate beatings, washings, and drying in the sunshine. They were next soaked for some time in a liquid formed of curdled buffalo's milk, and the astringent fruit of the yellow *myrobalans*. When the cloth was thoroughly impregnated with this mixture, it was taken out, squeezed, dried by exposure to the sunshine, rubbed and pressed. Then ensued a process of painting, by drawing devices on the cloth with a pencil. The liquors used for this purpose were not colours or pigments, but mordants. The first was a mordant of acetate of iron mixed with sour palm-wine, and thickened with rice-water. The mordant was applied to the figures or spots intended to become black. Then an aluminous mordant was applied to those parts which were to be red; it consisted of alum-water, coloured with powdered sappan-wood and thickened with gum. When these processes were finished, the cloth was exposed to the hottest sunshine, to dry the parts where the mordants had been applied; and then it was thoroughly soaked in large pots of water, to cleanse it from the loose or superfluous part of the mordants. A dye-vat was then prepared, consisting of certain roots boiled in water; and in this dye the cloth was boiled for a long period. The parts which had received the alum mordant were made red; those to which the iron mordant had been applied became black; and the remainder, after being washed and bleached in the sun, became white.

In China the use of silk is much more prevalent than that of cotton; but still it is stated by Staunton that blue-dyed cottons are worn very extensively among the humbler classes in China. That the Chinese are acquainted with the art of dyeing brilliant colours is too well known to need remark; but there has been an erroneous opinion prevalent as to the production of the tint exhibited by *nankeen* cotton, once so great a favourite in this country. Doubt has often been expressed whether this tint was imparted to the woven cotton by a process of dyeing, or whether the fibres of the cotton had this tint in the first instance. Mr. Baines, who has devoted much attention to the history of the various departments of the cotton manufacture in different countries, has collected the following passages from different writers to show that nankeen cotton is in reality not dyed at all:—Sir George Staunton, who travelled with Lord Macartney's embassy through the province of Kiangnan, to which province the nankeen cotton is peculiar, distinctly states that the cotton is naturally "of the same yellow tinge" which it preserves when spun and woven into cloth." He also says that "the nankeen cotton degenerates when transplanted to any other province." Mr. Baines then quotes the following statements from other authorities:—Sir G. T. Staunton (the son) has translated an extract from a Chinese herbal on the culture and uses of the cotton-plant, in which one of the varieties is described as a "dusky yellow cotton of very fine quality." Van Braam, who travelled in China with a Dutch embassy at the close of the last century, was commissioned by some European merchants to ascertain whether a deeper dye could not be made in China; but he reported that it was not dyed at all, the cotton itself being the same colour as the nankeen. The narrator of the voyage of the ship Amherst says, "Each family at Woosung appears to cultivate a small portion of ground with cotton, which I here saw of a light red colour. The nankeen cloth made from that requires no dye."

A nation on the borders of the Caspian were described by one of the classic writers as being in the habit of painting figures of animals on their garments with a vegetable dye:—"They have trees whose leaves possess a most singular property: they beat them to powder, and then steep them in water: this forms a dye, with which they paint on their garments figures of animals. The impression is so very strong, that it cannot be washed out; it appears to be interwoven in the cloth, and wears as long as the garment." Pliny, too, in speaking of the Egyptians, describes a process evidently analogous to a rude kind of printing: "Garments are painted in Egypt in a wonderful manner, the white cloths being first smeared, not with colours, but with drugs, which absorb colour. These applications do not appear upon the cloths, but when the cloths are immersed in a cauldron of hot dyeing liquor, they are taken out a moment after painted. It is wonderful that, although the dyeing liquor is only of one colour, the garment is dyed by it of several colours, according to the different properties of the drugs which had been applied to different parts. Nor can this dye be washed out. Thus the vat, which would doubtless have confused all the colours if the cloths had been immersed in a painted state, produces a diversity of colours out of one, and at the same time fixes them immoveably."

The Indian colours, or perhaps the mordants to fix the colours, seem to be laid on in India by a kind of pencil or reed; but Mr. Buckingham, while speaking

of Mesopotamia, says that the natives *print* devices by means of small blocks four or six inches square. Other nations of the East were known to have done the same before the art was practised in England.

If we transfer our attention to the Western world, we find in like manner that the art of imparting showy colours to their woven goods was understood by the Americans when the Spaniards first saw them, although there is no evidence to show that the *printing* of cottons was practised by them. Clavigero says that among the presents sent by Cortes to Charles V. were "cotton mantles, some all white, others mixed with white and black, or red, green, yellow, and blue; waistcoats, handkerchiefs, counterpanes, tapestry, and carpets of cotton;" and he also states that the colours of the cotton were extremely fine, as the Mexicans had both indigo and cochineal among their native dyes.

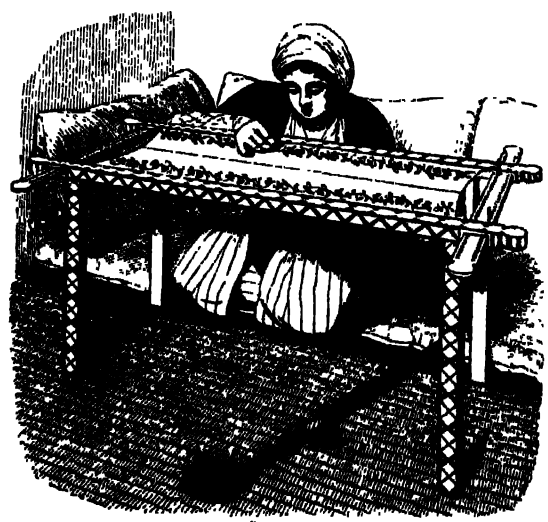
With regard to the state of these arts at the present day, it will be sufficient to remark that all rude nations, with some rare exceptions, possess a knowledge of the means to impart dyed colour to their garments; that in many parts of Asia there are still practised various modes of producing coloured devices on cloth, either by actual painting or by a rude kind of printing; that in the southern and eastern parts of Europe dyeing is carried on, but scarcely aught that can be called calico-printing; that in the United States this is almost a new branch of industry, carried on to but a very limited extent; and that the countries which are alone distinguished for this beautiful art are Britain, France, Switzerland, Belgium, and some parts of Germany.

The other department of finishing processes, to which we alluded as offering fitting subjects to be briefly touched on here, is the *tambouring* or *embroidery*, which is effected by means of white or coloured threads. This presents a marked difference when brought into comparison either with the printing or the weaving methods of decoration: the one relating to the application of colouring substances *to* the cloth; the other to the intermixture of differently coloured threads *in* the cloth; whereas tambouring relates to the tracing of a pattern by means of a line of thread after the cloth is woven.

Muslin is the chief kind of cotton goods to which this sort of decoration is applied: and the term 'tambouring,' by which the process is generally designated, seems to have been derived from the French name for a drum; the instrument or frame employed by the tambourers being formed something like a drum. In the simplest mode of conducting this process, the arrangements are as follows:—There are two circular hoops or drums, the outer one of which fits closely around the inner one. The muslin to be tamboured is stretched over the inner hoop, and is kept in its place by the outer hoop being applied to it, a layer of cloth or flannel being so adjusted as to make the two hoops cling tightly one to another. The apparatus, thus adjusted, is in a fit condition for the embroidress to work an ornamental pattern on the surface. In the most simple form of working, this apparatus is held merely between the knee and the chin of the workwoman; but a more convenient and less clumsy arrangement is to support the tambour on some kind of pedestal or stand, so as to leave the worker greater freedom of movement.

Such has been the common form where tambouring is carried on simply as a domestic employment. But when it became a branch of trade—that is, when the manufacturers of muslin made tamboured muslin one of the articles on sale in their warehouses—a more convenient and expeditious plan was adopted. It was found advantageous, where a piece of muslin or cloth was broad, and the pattern close and tedious, to employ a number of hands upon the same piece, in order that it might be quickly finished and brought to market; and hence the common tambour-frame was adopted. This frame is a very simple piece of apparatus, consisting merely of two parallel rollers placed horizontally in a wooden stand, and furnished with ratchet-wheels and catches to stretch the cloth. The piece of cloth is wound, one end over or around one roller, and the other end round the other; leaving a portion tightly stretched in a horizontal position between the two. According to the size of the portion thus stretched horizontally, three, four, or six persons can work at it simultaneously, each one confining her attention to one particular spot until finished, and a new portion being then unwound from one of the rollers.

The general arrangement here described corresponds almost exactly with that of the 'lace-running frame,' represented at page 113 of our last year's volume, in the Supplement relating to the Nottingham Lace Manufacture: in both cases the object being to stretch out a piece of cloth or of net, so that the hand of the workwoman can be placed either above or below it. Indeed, if we compare the following cut with the one just alluded to, we shall see that the Eastern ladies adopt the use of an embroidering-frame bearing a very near resemblance to the English tambouring-frame.



[Men'seg, or Egyptian Embroidery-frame.]

This is a sketch which Mr. Lane gives in his 'Manners and Customs of the Modern Egyptians," of the *men'seg*, or embroidery-frame employed by the Egyptian ladies in their private apartments. While speaking of the occupations of the upper grades of female society in Cairo, he says:—"Their leisure hours are mostly spent in working with the needle; particularly in embroidering handkerchiefs, head-veils, &c., upon a frame called *men'seg*, with coloured silks and gold. Many women, even in the houses of the wealthy, replenish their private purses by ornamenting handkerchiefs and other things in this manner, and employing a *della'leh* (or female broker) to take them to the market, or to other khareems, for sale."

The tambouring of muslin in private society has been practised for many centuries, or at least an analogous process on woven tissues of some kind or other: but the establishment of this as a regular branch of trade dates about the latter end of the last century. Glasgow has been and still is one of the head-quarters of the muslin manufacture; and the female population for many miles around that centre began to find

employment in embroidering or tambouring the muslin, or some of it, there made. It has been computed that the tambouring of muslin, when at its greatest extension, employed, wholly or partially, at least twenty thousand females in the western parts of Scotland. Of these females many lived in the vicinity of Glasgow, while others were scattered through various parts of the country, and were supplied with work and money by agents in the employ of extensive manufacturers.

A curious change has been effected in this manner within the last few years. Although the Glasgow manufacturers still supply tamboured muslin in large quantity, yet it is in Ireland that a considerable portion of this muslin is tamboured, thus illustrating the remarkable interchanges which occur when industry is allowed to seek out its own market. Mr. Hall, while describing one of the northern counties of Ireland, as he found it two or three years ago, says, "Through the whole of this district, the barony of Ards and that of Castlereagh, a large proportion of the peasantry are employed in what is technically termed 'flowering,' embroidering muslin, chiefly for the Glasgow manufacturers, who supply the unwrought material, and pay fixed sums for the workmanship. The workers earn generally about three shillings a week" (about as much as the lace-runners of Nottingham), "a small sum, but as the majority of the inmates of a cottage are similarly employed, sufficient is obtained to procure the necessaries of life, and, indeed, some of its luxuries, for the interior of many of the cabins presented an aspect of cheerfulness and comfort. We found, upon inquiry from the sources best informed upon the subject, that the number of girls occupied upon this branch of industry may be thus stated:—Between two and three thousand girls, from five to twelve years of age, employed at veining, at weekly wages averaging from 1*s.* 6*d.* to 2*s.* 6*d.*; sewers employed at needlework for Belfast houses, between two and three thousand, at weekly wages averaging 3*s.*; about ten thousand employed as needleworkers for Glasgow houses, at weekly wages averaging 4*s.* Thus upwards of 3000*l.* are paid weekly in the north of Ireland for the manufacture of needlework. Nearly the whole of the work sent from Glasgow to London, and other parts of England, is produced in this district. It is bleached in Scotland, and sold as 'Scotch work.' The manufacture is chiefly of collars, cuffs, &c."

It is scarcely necessary to describe here the particular nature of the tambouring or embroidering process. It consists simply in drawing the loop of a thread successively through other loops, in such a manner as to allow the thread to stand out prominently on the muslin, to form a pattern, and yet to adhere durably to it. About forty years ago, the idea occurred to Mr. Duncan, of Glasgow, to contrive a machine which should effect this tambouring in a very expeditious manner. He gave rather a melancholy picture of the condition of the muslin-tambourers of Glasgow at that time, and seemed to think that the employment of a machine would place the occupation on a more healthy footing. He accordingly invented a machine full of highly ingenious arrangements, which he afterwards described in Brewster's 'Edinburgh Cyclopædia.' Many difficulties occurred in bringing this machine into use; and although it was so comprehensive that forty tambouring needles could be superintended by one girl, yet from various causes it has never competed successfully with the common process of tambouring by hand. Mr. Duncan made a few remarks as to the probable reason why this kind of machine should not succeed to any eminent degree; and as these, if correct, apply to other cases equally with this one, we quote them:—"Upon the whole, experience has very clearly evinced that large sums cannot be prudently expended upon machinery calculated for articles of mere fashion, and that the exercise of mechanical genius will always be better directed to provide for the actual wants and conveniences, than to gratify the whims and caprices of mankind. In a refined state of society, ornamental arts must always exist; but the establishments for producing these ought ever to be calculated to meet those frequent stagnations of demand to which they are peculiarly exposed. The power to drive this machine being very small, and even that capable of great reduction by judicious alterations, an expensive establishment of mill-work, moved by power, is not by any means inherently necessary for the business. The regularity of motion produced by machinery is indeed desirable; but the attendant expense is more than equivalent to any advantage gained by its use."

More recently, a hand-worked machine (if we may use the term) of very beautiful construction has been introduced; for the purpose of working ornaments on the surface of woven fabrics, on the principle of the pantograph or of the profile-machine. It is true, that this machine is applied chiefly to the embroidery of silk goods; but the principle is equally available to cottons, if ever and whenever circumstances shall seem to render such a method desirable. The mode of proceeding is nearly as follows:—The machine consists of an upright frame, on the top of which is a moveable rod attached to one arm of a lever. The material which is to be embroidered passes over this rod to a roller beneath. On each side of this frame are carriages having a horizontal motion backwards and forwards; and these carriages are supplied with a system of clippers or pincers, and also of needles having eyes in the middle. The needles are threaded with the various coloured threads which are to be embroidered on the suspended piece of cloth. A workwoman, called a 'tenter' (a very general name in factories for those who attend on any particular machines), sitting at one end of the machine, moves the long arm of the lever to a point marked in a copy of the pattern; and by this movement the other arm of the lever, from which the cloth is suspended, is made to give a corresponding motion. When this motion has taken place, one of the carriages moves forwards, and drives its needles into the suspended cloth; and these needles are immediately seized by the clippers in the carriage at the other side. Then, by a slight adjustment on the part of the 'tenter,' an analogous but reverse movement takes place: the 'tenter' marks another point on the pattern; the suspended cloth makes another slight lateral movement; the back carriage thrusts the needles through the cloth; the front carriage seizes all these needles; and thus a second stage in the proceedings is completed. According to the number of needles employed, so is the number of repetitions of the pattern produced in the same piece at the same time. By passing each needle to and fro repeatedly through the cloth, a pattern is produced of any desired degree of complexity; yet so simple and regular is the action of the machine, that three females suffice for its management, one guiding the lever to the points marked on the pattern, and the other two directing the motion of the carriages.



[Chelsea Hospital, 1715.]

CHELSEA HOSPITAL.

An account of Chelsea Hospital has already been given in the 'Penny Magazine,' No. 60 (1833). A view of the north front is there given; the south front, which faces the Thames, is exhibited in the above engraving as it appeared in 1715. The buildings remain as they were, but some change appears to have been made in the grounds by the formation of the two canals bordered with stumpy pollard-trees on each side of the broad walk which extends from the front of the Hospital to the bank of the Thames. The public are admitted to this part of the grounds on Sundays in the afternoon, including the terrace on the bank of the river in front of the central quadrangle, and the broad walk bordered with lofty trees which overhang the river in front of the west quadrangle; but the grounds and terrace in front of the east quadrangle are reserved for the persons belonging to the establishment.

Chelsea Hospital, as stated in detail in the former article, stands on the site of a college of polemical divinity founded by James I., which continued to subsist in a languishing state till the times of the Commonwealth, when it was suppressed. In 1669 the buildings were given by Charles II. to the Royal Society, but in the beginning of 1682 they were bought back again by the government for 1300*l.*, in order to found the present Hospital for superannuated and disabled soldiers, which was done chiefly at the suggestion of Sir Stephen Fox, who himself contributed 13,000*l.*

According to the surveys made previous to the erection of the Hospital—

	Acres.	Roods.
The whole of the grounds belonging to the college were	30	0
Grounds bought of Lord Cheyne, Lord Ranelagh, &c.	42	2
	72	2

The old buildings were then demolished, and the present structure was commenced, May 12, 1682; it was completed in 1690. The design was by Sir Christopher Wren, who, in conjunction with Evelyn, had been appointed by the Royal Society to manage the sale of the College buildings to the government; and Richard, Earl of Ranelagh, Sir Stephen Fox, and Sir Christopher Wren, were appointed by patent, in 1691, commissioners for the conduct of the Hospital.

The buildings are arranged along the sides of a parallelogram about two hundred and sixty yards long, which extends east and west, and is divided into three square courts by two lofty ranges of building which run north and south. The north line of building is continuous as a centre and two wings, the centre consisting of the hall on the west and the chapel on the east, with an entrance-vestibule between them, which is lighted by a rather elegant domed lantern-tower. The arrangement of the buildings as the sides of three connected quadrangular courts is very convenient, thus admitting of a double front and double suites of apartments lighted from opposite sides. The central court is open towards the river; the two lofty ranges which separate the three courts contain the suites of apartments occupied by the pensioners, and are connected by a covered colonnade in front of the hall and chapel, provided with benches, and altogether well contrived for communication, for walking, or for sitting, in wet weather. The west quadrangle is open to the west; the east quadrangle is open to the east, with a beautiful clump of shrubs in the centre. The middle quadrangle has a bronze or brass statue of Charles II. in the centre, on a plain uninscribed stone pedestal. In Peck's 'Desiderata Curiosa' it is stated that Archbishop Sancroft, besides "a free gift towards the building and endowing of Chelsea Hospital, May 3, 1682, of one thousand pounds," "presented "a free gift to their Majesties King Charles II. and James II., of their statues in brass, the former placed upon a pedestal in the Royal Hospital at Chelsea, and the other in Whitehall." The statue of James II. is stated to have been the work of Grinling Gibbons. That of Charles II. is obviously by the same artist. The attitudes, the Roman costume, the arrangement of the drapery, the admirable modelling of the busts and limbs, are similar in both figures. The likeness of Charles is excellent, and by no means flattering, with something of a dignified sternness of expression. They are two extraordinary works of art for the period in which they were produced, and worthy to have been made to perpetuate the memories of better kings or better men than the dissolute Charles and the gloomy bigot James.

As a work of architecture Chelsea Hospital has

little to recommend it. The whole of the buildings are of brick, except the quoins, columns, cornices, and copings. Style there is none. The Grecian forms of pediments and Doric pillars are united with the flat brick walls and high slated roofs and bare windows of the commonest mode of house-building. There are no less than fourteen pediments, some of stone and some of brick, some with pillars and some with pilasters, some slightly projecting, and some almost as flat as the wall itself. As all the windows in the walls are entirely without mouldings, the defect is attempted to be supplied by surrounding each window by bricks of a redder colour than the rest. The windows in the roofs are numerous and pedimented, and thus in some degree relieve the roofs; and the stacks of chimneys, though plain flat masses of brick, are rendered somewhat ornamental by a projecting moulding of stone on the top of each.

The inside of the chapel is exceedingly plain, fitted up with oak panelling and benches, with the warlike decorations, somewhat inconsistent with any place of Christian worship, of colours and eagles taken in France, Spain, India, and elsewhere. The inside of the hall is equally plain.

The burial-ground is to the east of the Hospital; it is about two hundred yards long by about fifty yards wide. It is very neatly kept, and is open as a walk to the public every day. We should be glad to see the central walk leading to the terrace on the bank of the Thames also open to the public and the pensioners on other days as well as Sundays. There is an enclosed meadow to the north belonging to the Hospital, the area of which is about thirteen acres, with two side avenues of magnificent chestnut-trees and a central avenue of limes.

For many years Chelsea has been gradually changing its character of a village outskirt to that of a town suburb. The Chelsea Meadows are now covered with bricks, either making, or drying, or built up into houses. The favourite Willow Walk, which led towards Chelsea from the Milbank near the Penitentiary, has only one solitary dying willow left. The far-famed Chelsea Bun-houses have stepped back from the road where they formerly stood: they appear now as confectioners' shops in the line of houses forming the street, and the crowds who used to throng to them on Good-Friday is up, are no longer to be seen there, but are content with the "one-a-penny, two a-penny, hot cross buns,' manufactured for the day in London. Chelsea in fact has entirely lost the rural character which made it the favourite residence of Sir Thomas More, Sir Hans Sloane, and other distinguished persons, of some of whom an account has been given in No. 39, vol. i., page 316, of the 'Penny Magazine.'

The parish of Chelsea contained, in 1841, 40,179 inhabitants. There were 774 persons in the hospital, including officers and others belonging to the establishment. The pensioners, in addition to lodging, food, and clothing, receive from 8*d.* to 3*s.* 6*d.* a week according to rank and service. The out-pensioners amount to between 80,000 and 90,000.

Beside the Hospital there is at Chelsea a Royal Military Asylum for the support and education of children (especially orphans) of soldiers and non-commissioned officers. The building, which is a short distance north-east from the Hospital, was begun in 1801 and completed in 1805. In 1841 the number of persons in the Asylum (children, masters, mistresses, attendants, &c.) was 449.

About two hundred yards west from the Hospital is the Botanical Garden of the Apothecaries' Company, the ground of which was the gift of Sir Hans Sloane. Whoever has passed it in going up or down the river must have noticed the two dark and flat-topped cedars of Lebanon, which were planted in 1683, being then about three feet high. One hundred and ten years afterwards, in 1793, they were measured by Sir Joseph Banks, who found that the circumference of the larger at three feet from the ground was 12 feet 11½ inches, and that of the smaller 12 feet ¾ inch.

THE PLAIT MANUFACTURE OF TUSCANY.

IN a former number (740) a few details were given respecting the chief uses to which straw is applied in the arts, and, among others, of the application of split straws to the manufacture of hats and bonnets. A few additional matters may here be grouped together in further illustration of this latter named part of the subject in respect to the productions of Tuscany.

It may, perhaps, not be known to every one that the names *Tuscan* and *Leghorn*, as distinctive names for particular kinds of plaited straw, are pretty nearly synonymous in regard to the place whence the commodities are procured. Leghorn is a busy commercial port, at which few or none of the straw hats are made; but it is from thence that the productions of Tuscany (of which Leghorn is one of the chief towns) are exported. The hats, by whatever name they are called, are made in the country districts of Tuscany, and are brought to Leghorn to be exported; so that all alike are "Tuscan" in respect to the place where they are made; and all alike are "Leghorn" in respect to the port where they are shipped.

Some years ago M. Chateauvieux, in a collection of letters addressed to M. Pictet, gave an agreeable account of what came under his notice while travelling through Tuscany. He says, "The road I travelled was bordered on both sides by village-houses, whose distance from each other did not exceed one hundred paces. They are all built of brick; and the architect has bestowed upon them a justness of proportion and an elegance of form unknown in our climates. They consist of a single pavilion, that has often but one door and two windows in front. These houses are always situated along the road, and separated from it by a terrace and supporting wall, some feet in breadth. Upon this wall usually stand several vases of the antique shape, containing aloe plants, flowers, and young orange-trees. The house itself is entirely covered by vine-branches; so that, during summer, one knows not whether they are so many pavilions of verdure, or dwellings prepared for winter. In front of these houses, swarms of young country-girls are seen, dressed in white linen, with corsets of silk, and straw hats adorned with feathers inclining to one side of the head. They are constantly occupied in braiding the fine plait, the treasure of this valley, from which the straw hats of Florence are made."

After this somewhat highly coloured description, Chateauvieux proceeds to state that the straw-hat manufacture has been the chief source of wealth along the valley of the Arno, and that the mode of conducting it is as follows. Each young girl buys for a few pence the straw she wants; and then, after exerting her skill in braiding or plaiting it, sells for her own profit the hats she has prepared. The money she thus earns constitutes her portion. The father of the family has, nevertheless, the right to require of the women belonging to his house a certain amount of rustic labour on the farm; but this labour is performed by deputy, for the straw-workers, out of the produce of their labour, pay females from the mountain-districts to do the field-work instead of them: a curious exemplification of the mode in which industry becomes subdivided when allowed to follow its natural course. One of the straw-workers (at the time Chateauvieux wrote) could earn from thirty to forty sous a-day in plaiting straw;

while she could hire a poor Apennine woman to do her field labour for eight or ten. By this commutation of service, the straw-workers preserved the delicacy and flexibility of finger which was necessary for their fine and nice work, and which would be spoiled by such work as would harden and stiffen the hands. "Such, sir," continues the writer of the letters, "are the female peasants of the vale of the Arno, whose grace and beauty are so celebrated by travellers; whose language Alfieri went there to study; and who seem, in fact, born to embellish the arts, and to furnish them models. They are shepherdesses of Arcadia, but they are not peasants: they possess only the health and freedom from care of that state, and never know its anxieties, its sun-burnings, and its fatigues."

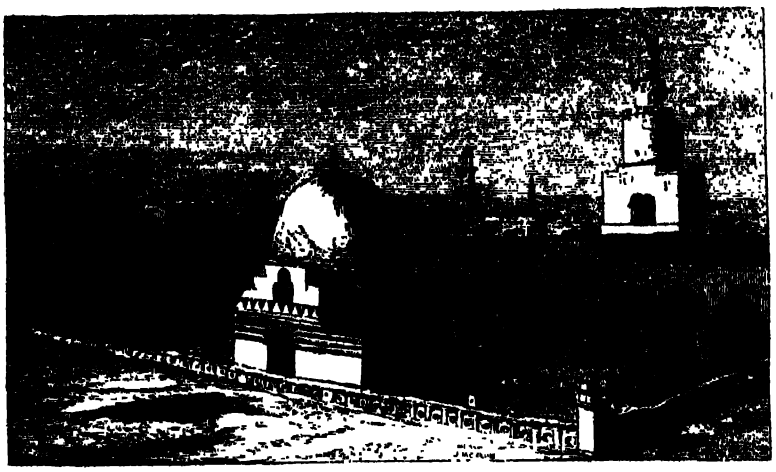
There seems strong reason to believe that this golden picture is a little too bright. Whether Chateauvieux, like many other travellers, judged from superficial observation, or whether changes of importance have taken place since the period of his visit to Italy, certain it is that later descriptions of the Tuscan straw-plait trade have been less attractive. Probably both these suppositions are correct. In Mr. M'Culloch's Dictionary the account given of some features attending the manufacture is not by any means so "Arcadian." After noticing the kind of straw employed, it is stated, "After undergoing a certain preparatory process, the upper parts of the stems (being first sorted as to colour and thickness) are formed into a plait of generally thirteen straws, which is afterwards knitted together at the edges into a circular shape called a 'flat' or hat. The fineness of the flats is determined by the number of rows of plait which compose them (counting from the bottom of the crown to the edge of the brim, which is generally eight inches). They are afterwards assorted into first, second, and third qualities, which are determined by the colour and texture; the most faultless being denominated the 1st, while the most defective is described as the 3rd quality. These qualities are much injured by the season of the year in which the straw is plaited. Spring is the most favourable, not only for plaiting, but for bleaching and finishing. The dust and perspiration in summer, and the benumbed fingers of the workwomen in winter, when they are compelled to keep within their smoky huts, plaiting the cold and wet straw, are equally injurious to the colour of the hats, which no bleaching can improve." The "smoky huts" of this account, and the "pavilions" of the other, are somewhat incongruous.

A few years ago Dr. Bowring visited Italy, for the purpose of reporting to the English government the state of trade and commerce in some of the Italian states; and in his report on this subject he gives the result of the information he had collected as to the recent progress of the straw-plait manufacture in Tuscany. An intelligent inhabitant of Prato gave the following information, relating apparently to the district around that town:—"The manufacture of straw-hats formerly gave employment to about two thousand females and two hundred men. This branch of industry has fallen off in a remarkable degree. A slight improvement of demand gives reason to suppose that it may now employ about one thousand women and fifty men: the difference in numbers is attributable to the shipments being now of a commoner description, while formerly they were only of the finest sort. Last year there was a manufactory of chip-hats, which employed a hundred looms: they are now no longer made, the fashion has changed. It would be not only difficult but impossible to ascertain the advantages accruing to the town of Prato from the manufacture of straw-hats. In the most flourishing times of this trade, it is said that the income arising from this source amounted to more than a million of crowns per annum. This assertion, however, is not grounded on sufficient proof. It is however certain that the manufacture was formerly in great activity; and the profit was considerable, for in this manufacture the whole production may be set down as wages of labour and profit, with the exception of a few hundred bags of wheat from Lombardy, being the seed of the straw. There is, however, unfortunately, one observation to be made: with the exception of one manufacturing establishment (Mazzoni and Darini), not a single remnant of even moderate wealth remains out of the riches to which the trade in straw-hats gave birth."

The same individual gave information concerning the domestic habits of the Tuscan peasants, which, if correct, will show that permanent prosperity is hardly compatible with them. "The lower classes of the population would have the means of providing for their necessities if they were not so eager after luxuries. The females are given to expensive dress, which deprives them of the means of supplying themselves with more necessary articles. In consequence of the prosperity of the straw-trade, which lasted from 1818 to 1825, luxury spread throughout the country; and it would excite a smile, were it not a subject for regret, to observe the country folks, in embroidered stockings and pumps, with large velvet bonnets, trimmed with feathers and lace; but in their houses they, as well as the artizans in the town, are miserably off; and they who are even genteelly dressed abroad have rarely more than a miserable pailliass for a bed at home. Deprived of the advantages of the straw trade, the situation of the country people, especially those of the mountainous parts, is very distressing."

The Tuscan straw-trade has been very much influenced by the current of English legislation respecting import duties; but without dwelling upon this point, we may offer a remark or two concerning the quality and growth of the straw employed in this branch of industry. The kind of straw employed for this purpose is the stalk of the triticum turgidum, a variety of bearded wheat, very similar to some which is grown in Wiltshire. This kind of wheat is cultivated largely in Tuscany, both for food as well as for plaiting. In many parts of the valley of the Arno, between Pisa and Florence, it is grown purposely for the sake of the straw. In such case the seed is thickly sown on a poor strong soil on the bank of the river; and when the crop is a few inches high it is mown, but not close to the ground; a mode of treatment which more or less subdues the rankness of the plant, and renders the after stems more slender. If they are still too coarse, the crop is again mown, and so on to a third and even a fourth time, according to the vigour of the plant. When the stems are sufficiently fine, they are allowed to grow; and after the bloom is over, but while the grain is still very milky, the plants are pulled up, and exposed to the sun on the sandy shore of the river, care being taken to water them from time to time. When the straw has attained the proper colour, a very careful selection is made of it, according to its quality, and it is divided into several sorts according to the size of the straw. The only part used is from the base of the ear a few inches down towards the first joint. The part between the first and third joint is reserved for common plait.

The Mechanics' Institutions of Great Britain.—Taking the whole number of such institutions at four hundred, it is probable that at present they contain somewhere about eighty thousand members, and possess about 400,000 volumes of books; that in the course of a year they raise and expend a revenue of not less than 30,000*l.*; and that they procure the delivery of near four thousand lectures, on subjects so various as scarcely to omit any department of knowledge.—*Westminster Review.*



[Mosque of Ibn-Tooloon.]

THE ENGLISHWOMAN IN EGYPT.

Egypt has ever been, and probably ever will be, an interesting country to the whole of the civilized world, and it has accordingly always commanded a great deal of attention, and almost innumerable are the works descriptive of its antiquities, geography, government, religion, literature, manners, and customs. From the peculiarity, however, of Oriental manners, one work was still wanted, which is here happily supplied, or, rather, partly supplied, as a second volume is to follow. The jealousy with which the women are guarded prevents a male from forming any notion of their domestic life; but Mrs. Poole has now done for Egypt what Lady Mary Wortley Montague did for Turkey, and even more, as her relationship to Mr. Lane, the celebrated Arabic scholar, and long a resident in Egypt, has enabled her to supply information on subjects not generally to be expected from female travellers. The work forms one of the series of 'Knight's Weekly Volume.' As a brief specimen we will take a description of the Hareem of Habeeb Eféndee, the late governor of Cairo, with representations of the dress worn in-doors, and the riding-dress which Mrs. Poole speaks of as wearing, and which certainly seems amply sufficient to cover and conceal her European dress until it is removed.



[A Turkish Lady in the Riding Attire of Egypt.]



[A Turkish Lady in the ordinary dress worn in an Egyptian Hareem.]

"When we arrived at the house of Habeeb Eféndee, and had passed the outer entrance, I found that the hareem apartments, as in other houses of the great in this country, are not confined to the first and upper floors, but form a separate and complete house, distinct from that of the men. Having passed a spacious hall, paved with marble, we were met at the door of the first apartment by the elder daughter of Habeeb Eféndee, who gave me the usual Eastern salutation, touching her lips and forehead with her right hand, and then insisted on removing my riding-dress herself, although surrounded by slaves. This was a mark of extraordinary condescension, as you will presently see. In the houses of the middle classes, the ladies generally honour their visitors by disrobing them of their riding-dress; but in the high hareems this office is generally performed by slaves, and only by a member of the family when a guest is especially distinguished.

"In visiting those who are considered the noble of the land, I resume, under my Eastern riding costume, my English dress; thus avoiding the necessity of subjecting myself to any humiliation. In the Turkish in-door costume, the manner of my salutations must have been more submissive than I should have liked; while, as an Englishwoman, I am entertained by the most distinguished, not only as an equal, but generally as a superior. I have never given more than the usual salutation, excepting in the case of addressing elderly ladies, when my inclination leads me to distinguish them by respectfully bending, and lowering my right hand before I touch my lips and forehead, when I am presented, and when I leave them. On receiving sweetmeats, coffee, sherbet, or any refreshment, and on returning the cup, plate, &c. which contain them, I give always the customary salutation to the chief lady of the hareem, whose situation on the divan points her out as the superior of the party. . . .

"When the lady I have mentioned had removed my surtout apparel, a slave in attendance received them in an exquisite pink kerchief of cashmere, richly embroidered with gold. The kerchiefs of this kind, in the hareems of the wealthy, are generally very elegant, but that was the most perfect specimen I have seen of correct and tasteful embroidery. The riding-dress was immediately taken into another room, according to a usual custom, which is observed for the purpose of creating a short delay, giving an opportunity to offer some additional refreshment when the guest has proposed to take her leave. My new acquaintance then conducted me to the divan, and placed me next to the seat of honour, which was reserved for her mother, the first cousin of the late Sultan Mahmoud, who soon entered the room, and gave me a cordial welcome, assigning to me the most distinguished seat on her right hand, the same to which her daughter had conducted me, while the grandmother of Abbas Pasha sat on her left. She was soon followed by her second daughter, who greeted me with much politeness, and in a very elegant manner assured me that I was welcome. She was more richly attired than her sister, therefore I will describe to you her dress.

"She wore on her head a dark handkerchief twisted round a tarboosh, with a very splendid sprig of diamonds attached to the right side, and extending partly over her forehead. The sprig was composed of very large brilliants, disposed in the form of three lutes, in the centre, from each of which a branch extended, forming an oval shape, at least five inches in length. High on the left side of her head she wore a knot or slide of diamonds, through which was drawn a bunch of ringlets, which, from their position, appeared to be artificial; her tarboosh had the usual blue silk tassel, but this was divided and hanging on either side. Her long vest and trowsers were of a dark flowered India fabric; she wore round her waist a large and rich cashmere shawl; and her neck was decorated with many strings of very large pearls, confined at intervals by gold beads. She was in one respect strangely disfigured; her eyebrows being painted with kohl, and united by the black pigment in a very broad and most unbecoming manner. Many women of all classes here assume this disguise: some apply the kohl to the eyebrows as well as to the eyes, with great delicacy; but the lady in question had her eyebrows so remarkable, that her other features were deprived of their natural expression and effect.

"A number of white slaves formed a large semicircle before us, and received from others, who waited in the ante-chamber, silver trays, containing glass dishes of sweetmeats. There were three spoons in each dish, and two pieces of sweetmeat in each spoon. These were immediately succeeded by coffee, which was also brought on silver trays; the small china cups being, as usual, in stands, shaped like egg-cups; but these were not, as in ordinary houses, simply of silver filigree, or plain, but decorated with diamonds. They were certainly elegant, but more costly than beautiful. The coffee is never handed on the tray, but gracefully presented by the attendant, holding the little stand between the thumb and finger of the right hand. After these refreshments a short time elapsed, when two slaves brought in sherbet on silver waiters, in exceedingly elegant cut-glass cups, with saucers and covers. Each tray was covered with a round, pink, richly embroidered cover, which the slave removed as she approached us. To receive our cups, of the contents of which, according to custom, we drank about two-thirds, another slave approached with a large white embroidered kerchief ostensibly for the purpose of wiping the mouth; but any lady would be thought quite a novice who did more than touch it with her lips.

In the course of conversation I expressed my admiration of the Turkish language, and, to my surprise, the elder of the young ladies gave me a general invitation, and proposed to become my instructress: addressing herself to Mrs. Sieder with the most affectionate familiarity, she said, 'O my sister, persuade your friend to come to me frequently, that I may teach her Turkish; in doing which I shall learn her language, and we can read and write together.' I thanked her for her very polite offer, but made no promise that I would become her pupil; forseeing that it would lead to a very considerable waste of time. In all the hareems I have visited, Arabic is understood and spoken; so I do not expect any advantage from a knowledge of Turkish, unless I could devote to its study considerable attention.

"The perfect good humour and cheerfulness which pervaded this family circle is well worthy of remark, and much engaged my thoughts during the morning of my visit. All that I observed of the manners of the Eastern woman, at Habeeb Eféndee's and elsewhere, leads me to consider the perfect contrast which the customs of Eastern life present to the whole construction of European society. . . .

"Before our departure it was proposed that I should see their house; and the elder daughter threw her arm round my neck, and thus led me through a magnificent room which was surrounded by divans; the elevated portion of the floor was covered with India matting, and in the middle of the depressed portion was the most tasteful fountain I have seen in Egypt, exquisitely inlaid with black, red, and white marble. The ceiling was a beautiful specimen of highly-wrought arabesque work, and the walls as usual white-washed, and perfectly plain, with the exception of the lower portions, which, to the height of about six feet, were cased with Dutch tiles.

"I was conducted up stairs in the same manner; and I could not help feeling exceedingly amused at my situation: and considering that these ladies are of the royal family of Turkey, you will see that I was most remarkably honoured.

"When we approached the bath, we entered the reclining-room, which was furnished with divans, and presented a most comfortable appearance; but the heat and vapour were so extremely oppressive in the region of the bath, that we merely looked into it, and gladly returned to the cool gallery. I am not surprised that you are curious on the subject of the bath and the Eastern manner of using it; and I hope to devote a future letter to a description of the operation (for such indeed it may be styled), and the place in which that operation is performed.

"On our reaching the stairs, the second daughter of Habeeb Efendee took her sister's place; and with her arm round my neck, we descended the stairs, and re-entered the room where I had received so kind a reception. When we rose to take our leave, the elder daughter received my riding-dress from a slave, and was about to attire me, when her sister said, 'You took them off, it is for me to put them on.' The elder lady partly consented, retaining the habarah, and thus they dressed me together. Then, after giving me the usual salutation, they each cordially pressed my hand, and kissed my cheek. We then descended into the court, attended by the ladies, and a crowd of white slaves. Having crossed the court, we arrived at the great gate, through which I had before passed, which was only closed by a large mat, suspended before it, forming the curtain of the harem. This mat was raised by black eunuchs, who poured from a passage without; and immediately after the ladies bade us farewell, and returned, followed by their slaves. The principal eunuch ascended first the mounting-platform, and placed me on the donkey, while two others arranged my feet in the stirrups, our own servants being kept in the background."

Mrs. Poole has been equally successful in entering other—to us—forbidden ground. She visited the mosques of Cairo, one of which she describes as follows:—

"At the threshold all persons remove their shoes, or slippers, the ladies walking, in the mosque, in the yellow morocco socks, or boots, which I have before described to you; and here I must remark on the scrupulous attention which is paid to cleanliness; for the pale yellow morocco is scarcely injured by a whole day spent in perambulating these Muslim sanctuaries. The men generally carry the shoes in the left hand through the mosque, placed sole to sole, and some ladies carry theirs, but we, like many others, preferred leaving them with our servants, for the walking-dress in itself is so exceedingly cumbrous, and requires so much management, that two hands are scarcely sufficient to preserve its proper arrangement.

"The mosque of the Hasaneyn,* which is situated to the north of the Azhar, and not far distant, was founded in the year of the Flight 549 (A.D. 1154-5); but has been more than once rebuilt. The present building was erected about seventy years ago. The fore part consists of a handsome hall, or portico, the roof of which is supported by numerous marble columns, and the pavement covered with carpets. Passing through this hall, I found myself in that holy place under which the head of the martyr El-Hoseyn is said to be buried deep below the pavement. It is a lofty square saloon, surmounted by a dome. Over the spot where the sacred relic is buried, is an oblong monument, covered with green silk, with a worked inscription around it. This is enclosed within a high screen of bronze, of open work; around the upper part of which are suspended several specimens of curious and elegant writing. The whole scene was most imposing. The pavements are exquisite; some of virgin marble, pure and bright with cleanliness, some delicately inlaid: and the whole appearance is so striking, that I am persuaded if a stranger were to visit the shrine of El-Hoseyn *alone*, he would never believe that El-Islam is on the wane.

"All the visitors whom I saw passed round the tomb, walking from left to right, touching each corner of the screen with the right hand, and then applying that hand to their lips and forehead, reciting at the same time, but inaudibly, the Fát'hah (or opening chapter of the Kurán), a ceremony also observed on visiting *other* tombs. Many were most devoutly praying, and one woman kissed the screen with a fervour of devotion which interested while it grieved me. For myself however, I can never think of the shrine of El-Hoseyn without being deeply affected by reflecting upon the pathetic history of that amiable man, in whom were combined, in an eminent degree, so many of the highest Christian virtues."

The mosque which we have given at the head of the article is that of Ibn Tooloon. It is the most ancient Arabian building in Cairo, except the Nilometer, having been founded in A.D. 876-7, and never rebuilt. It is, however, now in a state of rapid decay, and is much neglected. The space which it occupies is about 400 feet square. It is constructed of brick, covered with plaster, and consists of arcades surrounding a square court; in the centre of which is a tank for ablution, under a square stone building, surmounted by a dome. The arches in this mosque are slightly pointed: this is very remarkable, as it proves, as the mosque was constructed A.D. 876-7, and has never been rebuilt, that the Eastern pointed arch is more ancient than the Gothic. This remark I borrow from my brother's manuscript notes. A great mád'neh, with winding stairs round its exterior, stands on the north-west side of the mosque; with which it is only connected by an arched gateway. The whole of this great mosque is in a sad state of decay; and not even kept decently clean, excepting where the mats are spread." The dome seen in the centre of the view is over the tank, and the lofty building on the right is the great minaret. The minaret seen to the right of the dome belongs to an adjacent mosque.

* By the Hasaneyn are meant Hasán and Hoseyn, the grandsons of the Prophet.

ON MEDALLIONS FORMED "EN CLICHÉE."

THERE is a very curious method sometimes practised, and having its origin in France, of forming large medallions by a process called "*en clichée*;" in which the metal of which the medal or medallion is made is used while in a pasty state, between solid and liquid. The term comes from the French verb "clicher," which imports the formation of a metallic cast in a soft or liquid state—in some degree analogous to our word "stereotype," but differing from it inasmuch as the metal is in the one case used in a pasty state, and in the other as a liquid.

In order to understand this process, it may be well to see how medals are commonly produced. A medal may be regarded in the same light as a coin, while a medallion is merely a convenient name for one of larger diameter, both having a device in relief on one or both surfaces. The clichée medallions have a device only on one side, as have some others; while all medals used as coins have devices on both sides. The plan of casting such in a mould would produce such very rude impressions, that though probably practised at an early period, it has long been superseded by the

plan of striking the coin forcibly while in a cold and solid state by an engraved punch.

When this method was first introduced, the impression was formed by the blows of a hammer. The device (in "intaglio," or the reverse of "relief") was engraved on a hard piece of steel, and by repeated blows of a hammer this device was transferred to a blank piece of gold, silver, copper, or other metal softer than steel, thus yielding a relief copy of the intaglio die. This method was the only one known till the reign of Henry II. of France, when the coining-mill was invented by Antoine Brucher, a French engraver, and the first money was struck with it in that kingdom in the year 1553. The use of it continued in France till 1585, when it was laid aside on account of its great expense in comparison with coinage by the hammer; nor was it permanently revived till 1645. In England Queen Elizabeth used the coining-mill in 1562; but after ten years' use it was laid aside as more expensive than hammer-coining, and was not finally restored till many years afterwards. Although the process of casting or punching is not now adopted for coins, yet it is occasionally for medals; the device being first modelled in wax, then a mould made from the model, then the medal cast in the mould, and lastly chased or touched up by the hand of the engraver; but this process is necessarily slow and expensive.

In the modern practice of medal or coin striking, the original engraved die is not itself used, but a duplicate produced from it. A die would sometimes break in the first using, and the labour of the engraver be thus utterly lost; whereas by having a multiplicity of *dies*, a succession is kept up without having the die re engraved. The process is thus managed:—There is first a delicately formed model of the device, to serve as a pattern. The engraver from this engraves a *matrix*, or reverse device, on the end of a piece of soft cast steel, making the depth of the cavity equal to the rise of the model, and all the various parts corresponding in a similar way. Another mode of producing the matrix is to make a wax model of the device; then take a plaster mould from this; then take an iron cast from this mould; then place this iron cast in a peculiar machine, and pass the end of an instrument to and fro over the surface in such a manner as to guide the point of the cutting tool which engraves the steel matrix, somewhat on the same principle as the action of the silhouette or profile machine. When the engraving is finished, the matrix is hardened by a process requiring very especial care. It is put into a cast-iron pot, completely imbedded in animal charcoal, chiefly made from leather; and this pot is put into an air furnace, where the heat is so applied as to raise the matrix gently to the required temperature. The matrix is then suddenly plunged into water of a particular temperature, by which it acquires an excessive degree of hardness. From this matrix numerous impressions may, by heavy blows, be taken on blank pieces of cast-steel, which will then resemble the original model in being in relievo. From one of these *puncheons*, as they are called, the dies are produced; the engraver having first touched up the more delicate lines, and the puncheon having been hardened as the matrix had been. The dies, impressed in soft steel by the puncheon, have the device in intaglio, like the matrix; and when they in their turn have been hardened, they are fitted to produce the impression on the coin or medal, which has the device in relief, like the puncheon. We thus see that there are five alternations—the model, in relief; the matrix, in intaglio; the puncheon, in relief; the die, in intaglio; the medal or coin, in relief. When there is a device on each side of the medal, as in all coins, there are two dies in a pair, one for each device; and the stamping is effected by placing one die down flat, then the blank piece of metal upon it, and letting the other die sink forcibly on it, so that the blank may receive both impressions at once. When the coin, medal, or medallion is of large size, or in bold relief, many blows are required to transfer the device; and between the blows the medal has to be placed in a furnace and annealed, to prepare it for the reception of the next blow. In a large medal struck by the celebrated Boulton, some of the copies received three hundred blows each, and were heated and annealed three hundred times!

It is plain from the above description that the customary mode of stamping coins must involve great labour, skill, and expense; and for the immense number of pieces which are thus stamped, there can be no doubt that the plan is most efficient in the end; but for the production of medallions which are intended for ornament and not for use, and which would therefore admit of the use of soft metals, the *clichée* method becomes worthy of attention. During the time of Napoleon, it was very customary to make large medallions en clichée, bronze them, mount them into the lids of snuff-boxes, and protect them from injury by covering them with convex glasses. The metal employed was not such as would bear handling or hard usage, or else the clichée method would not have been applicable.

The clichée medallions were produced in the following manner.—There was a hollow box, case, or receptacle, enclosed on all sides, so as to retain the metal which was splashed or dispersed by the operation of stamping, the interior of the box being lined with sheet-lead to aid in this object. The stamper was attached to the lower end of a rod which slid up and down through the top of the box, and had a sufficient range to fall to the bottom of the box or to rise to the top of it. This stamper was formed of several different pieces, so put together as to hold in a proper position the model which was to produce the die, or the die which was to produce the medallion. At the bottom of the box was a plate of cast-iron, on the middle of which was placed a small paper tray; and the paste-like metal was put into this tray to receive the impression from the stamper.

The metal employed was one or other of those kinds known by the general name of *fusible metal*, that is, one which melts at a very low temperature. The ordinary type-metal, formed of lead and antimony, was the basis of the alloy employed. Broken types were in fact purchased as the source of supply, and slightly modified to fit the metal for the desired object. Type-metal consists generally of about five parts of lead to one of antimony; and to this was added a little more lead, till the state of the mixture was such that a plate of it would bend a little before breaking. Another test of its proper quality was that it would remain in a pasty state, between solid and liquid, when the temperature was not so high as to singe or even to discolour a piece of paper. Sometimes an alloy was used, known in England as "Sir Isaac Newton's fusible metal," composed of three parts of tin, five of lead, and eight of bismuth; an alloy which melts at the heat of boiling water.

The compound metal was melted in a cast-iron vessel; and when in a liquid state, if a little of it were taken up in a ladle, and shaken round and round, it would assume a pasty consistence, as a commencement of crystallization. Advantage was taken of this particular condition in the metal to impress the device upon it; when, from its pasty coherence, it could not slip away from the blow, and was yet sufficiently plastic to receive the impression.

Such being the machine employed and the material acted on, the process was thus conducted. The original

medallion, which was to serve as a copy for all others, was sometimes made to produce a mould *en clichée*, and this mould then produced medallions by the same means; while in other cases the medallions were struck immediately from the engraved die. - Supposing the former to have been the plan adopted, the pattern medallion was fitted into the stamper with its face downwards, so that it could not shift in any direction. A door in the front of the box was opened, and a little of the pasty alloy was laid on the paper-tray at the bottom. The door was then closed, and in the act of so doing, it loosened a catch or detent, whereby the stamper was allowed to fall down on the pasty mass beneath, impressing the device upon it, and scattering some of the remaining metal around in the closed box. The mould or die thus formed, when taken from the box, was of course in intaglio, the reverse of the original medal; and when it was trimmed at the edges, it was placed in the stamper in lieu of the original. The manufacture of the medallions then commenced, by using the clichée die as a stamp, and pouring small quantities of the pasty metal into the paper tray, removing the medallions one by one as they were formed, and putting a new portion of paste-metal into the tray after each striking. If the medallions were made from an engraved die, this of course served the same purpose as the clichée mould or die, and the die was fixed into the stamper. The cavity in the middle of the stamper was adapted to the reception of different sized dies, for the production of different medallions.

The back and edge of the medallions were necessarily rather rough and incomplete after this mode of production; and to bring them to a proper form trod-lathes were employed. In the first of these lathes the medallion was fixed centrally, and the edge turned to a true circular form; while in the second the medallion was held at the edges so that the back might be reduced to a level surface and a proper thickness. Sometimes two medallions, one having a device representing an obverse and the other a reverse, were cemented together back to back so as to form a medal, and the lathe was then employed to give regularity to the jointed edge.

The medallions produced by the clichée method were often bronzed by the following process. A solution was prepared of one part of sulphate of iron, and one of sulphate of copper, in twenty parts of distilled water; and a second solution of one part of verdigris in four of white wine vinegar. The medallion was filed and polished on its edge, strongly rubbed with a brush dipped in tripoli powder and water, and well washed and dried. The first solution was lightly applied all over the surface by means of a camel-hair pencil, and the medallion was then washed and wiped: when it was found to have acquired a slightly blackish colour, enabling the next solution to act upon it more readily. The acidulated solution of verdigris was next applied with a pencil, until the medallion assumed a deep copper colour. When dry, it was polished with a soft brush dipped in red lead, which was made to adhere to the metal by breathing gently on the latter. It was lastly polished with a dry brush alone. The medallions were sometimes tinged with bronze-powder, applied by means of gold-size. Another method of bronzing or coppering medallions has been so deceptive that they have often been mistaken for copper medallions. The surface, according to this method, is moistened with a little spirit of wine, and just before it dries it is dusted over with a powder formed of such a mixture of red chalk and black-lead as will most nearly imitate the required colour.

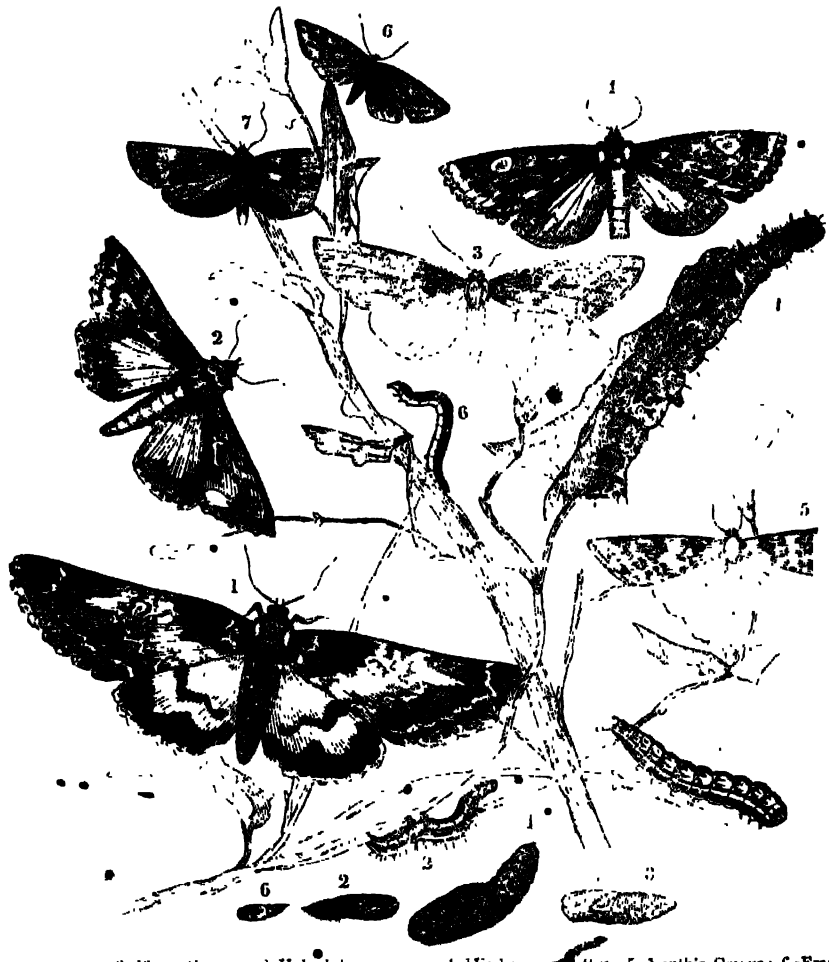
Clichée medallions may be made from various kinds of dies or moulds; from iron, brass, or copper; from wood or sulphur; or from plaster of Paris. The pasty metal is chosen with reference to the temperature at which it melts, since some kind of dies would be sooner injured by heat than others.

The Italian figure casters make very perfect clichée-moulds for small casts. They take a portion of the pasty mass, and place it on a piece of paper; upon this they lay the medal, and under both a piece of carpet; upon the medal they lay a log of wood, and then a sharp blow on the wood ensures the transference of an impression from the medal to the soft metal.

If the alloy is used while in too hot a state, it produces a crystallized appearance on the surface of the clichée, which destroys the intended effect; whereas if it be too cold, the fine lines of the device will not be brought out. If a clichée medallion be made from a clichée die, the latter requires to be cooled after a few times using, to prevent it from being melted.

First Effects of Printing.—One of the first effects of printing was to make proud men look upon learning as disgraced, by being thus brought within the reach of the common people. Till that time learning, such as it was, had been confined to courts and convents, the low birth of the clergy being overlooked, because they were privileged by their order. But when laymen in humble life were enabled to procure books, the pride of aristocracy took an absurd course, inasmuch that in one it was deemed derogatory for a nobleman if he could read or write. Even scholars themselves complained that the reputation of learning, and the respect due to it and its rewards, were lowered when it was thrown open to all men: and it was seriously proposed to prohibit the printing of any book that could be afforded for sale below the price of three soldi. This base and invidious feeling was perhaps never so directly avowed in other countries as in Italy, the land where literature was first restored; and yet in this more liberal island ignorance was for some generations considered to be a mark of distinction by which a man of gentle birth chose, not unfrequently, to make it apparent that he was no more obliged to live by the toil of his brain than by the sweat of his brow. The same changes in society, which rendered it no longer possible for this class of men to pass their lives in idleness, have completely put an end to this barbarous pride. It is as obsolete as the fashion of long finger-nails, which in some parts of the East are still the distinctive mark of those who labour not with their hands. All classes are not brought within the reach of your current literature,—that literature, which, like a moral atmosphere, is, as it were, the medium of intellectual life, and on the quality of which, according as it may be salubrious or noxious, the health of the public mind depends.—*Biography of Wm. Caxton.*

Climate of Kordofan.—Kordofan is the most southern province under the sway of the ruler of Egypt. It extends on the north from Hazero to Kadero; and on the south from the Nuba mountains; and the eastwards from Caccia to the Shellook mountains. The whole country may be regarded as a cluster of oases contiguous to each other. The soil is sandy, and the province is flat rather than hilly. During the rainy season the ground may be reckoned fertile; but for two-thirds of the year everything is burnt up, and the country looks like a barren waste. Kordofan has no flowing rivers. The running streams which are seen during the rain are dried up as soon as they are past, and the partially-formed lakes share the same fate. The climate is peculiarly unhealthy, especially during the wet season. At that period not a hut is to be found in which there are not several inmates sick. Throughout the entire of the dry season, which lasts about eight months, the sky is as bright as a mirror—clear, cloudless—and the heat, especially in April and May, intolerable. From eleven o'clock, A.M. till three, the thermometer, in the shade, rises from 117 to 122 degrees of Fahrenheit. It is then impossible for any breathing creature to remain in the open air. The natives sit during these hours as if they were in a vapour-bath. Each individual is completely prostrated; his mental and physical powers give way under the intense heat, and he looks in vain for weariness. Business is a stand. As the evening approaches, all is again life and activity. The market-place is filled, the fires are lighted, and among the natives the dance and song are continued till midnight. The dry season is frequently visited with terrible storms.—*Pallme's Travels in Kordofan.*



[1, Catocala sponsa; 2, Plusia Gamma; 3, Hylophila prasinana; 4, Mœcha ovyacantha; 5, Xanthia Cerago; 6, Brastria sulphurea; 7, Saturnia spini.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

British Moths—*continued.*

1. The dark Crimson Underwing (Catocala sponsa). Perfect insect, caterpillar, and pupa.

The moths placed by entomologists under the genus Catocala are amongst the largest of European lepidoptera, and, we may also add, amongst the most beautiful, being no less distinguished for the liveliness and brilliancy of their markings than for their size. They are active and vigorous, and fly during the day if disturbed even slightly; as evening approaches they are all animation, darting along with great rapidity. During repose the wings are slightly deflexed and a little expanded, forming a broad triangle. The wings are deeply crenate, the posterior being mostly of a brilliant crimson with black fasciæ and margins.

In our island the dark Crimson Underwing is rather local in its distribution; a few examples, principally in the caterpillar state, have been taken upon the oaks in Richmond Park, in Birch and Darent Woods, and near Windsor and Leatherhead. In the New Forest many specimens have been captured. In France it is occasionally very abundant in the oak woods. It abounds in Hungary.

The female exceeds the male in size; and both differ in their colouring and the boldness of their markings, as well as in size; the varieties of this insect have been regarded by some naturalists as so many distinct species, but erroneously. Generally the head and thorax are deep fuscous freckled by black; the anterior wings are of a deep yellowish ash clouded with fuscous with dark transverse undulated strigæ, two of which, in the middle of the wings, are considerably angulated; and between them is a yellowish white patch, representing the letters J. G., the latter very conspicuous. Between these and the inner margin is a pale, rounded, and somewhat rhombic spot, flavescent or cinereous, and edged with blackish. The posterior wings are bright crimson, with a narrow flexuous black fascia, and a broad posterior belt, with a fuscous fringe. The caterpillar is of a brownish red, variegated with pale blue; some of the anterior as well as the posterior or caudal segments are tuberculated. The pupa is bluish, and the insect appears towards the end of June.

2. The Silver Y-moth (Plusia Gamma). Perfect insect, caterpillar, and pupa.

The Plusiæ are brilliant moths, eminently distinguished for the splendour and richness of their colouring; all the species have the wings more or less adorned with metallic pencillings, dots, or bands, upon a rich purplish or ruto-fulvescent ground. The thorax has a full crest, and the upper surface of the body is generally furnished with elongate tufts of hair like scales. In their habits they are diurnal; glittering in

the sun, they extract the nectar from their favourite flowers, exposing their gorgeous liveries to view, and flitting about with great address and elegance. It is indeed a general rule, that animals attired in a brilliant dress affect the full blaze of day, while those of sombre hues or of dusky markings come forth with the shades of evening, with the gloom of which their colours harmonize. The caterpillars in walking bend their backs, and are hence termed half-loopers: they spin a delicate silken web, and change to a shining pupa, armed with a sharp spine at the apex. The present species is common in most parts of England, and is spread not only over Europe, but extends its range through a great part of Asia, and a closely allied species exists in North America. It is active on the wing during the early part of the day, and also in the afternoon, both before and after dusk. The general colour of the body is deep ashy grey. The anterior wings are varied with griseous and roseate fuscous, often with a silvery tinge. On the disk, which is almost black, is a little silvery mark, having the form of the Greek letter γ or λ, or the English letter Y. The hinder wings are of a dusky grey, with a blackish marginal band. The caterpillar is green with a brown head, a lateral yellow streak, and six white dorsal lines. It feeds on a great variety of herbage.

3. The Green Silver-line moth (Hylophila prasinana). Perfect insect, caterpillar, and pupa.

This species belongs to the Tortricidæ of Stephens, a family of small moths, remarkable for the great variation to which the species are subject. During repose they rest with slightly deflexed wings, and from the breadth and shortness of the wings assume a bell-like form. The larvæ generally reside within the covert of a leaf, which they have rolled up so as to form an envelope. Some, however, live in the pulp of fruits: they are very active, and run with great rapidity either backwards or forwards.

The Green Silver-line moth is not uncommon in the woods around London and in other parts of England, and extends over the whole of temperate Europe. The anterior wings are green, with three oblique streaks of white; thorax green, with four white stripes. In the male the anterior margin of the apex and hinder margin are fulvous. Posterior wings yellowish white.

Both sexes vary considerably in the intensity of colour.

The caterpillar is pale yellowish green, with a yellow lateral line, and minute dark specks; two red lines at the tail. It feeds on the oak, ash, alder, beech, &c. The pupa is reddish brown, sprinkled with an ashy powder: it is enclosed in a firm silken cocoon. The perfect insect appears in June.

4. The Green Brindled Crescent moth (Miselia oxyacanthæ).

This species is one of the most beautiful of its genus; it is, however, far from being an uncommon species; but from the lateness of its flight is seldom seen on the wing: on the continent it is widely spread.

The anterior wings are of a beautiful yellowish brown, prettily varied with pale reddish and green; the latter colour predominating on the inner margin. Two blotches, of large size and irregular form, are of a pale colour; under the orbicular blotch is a third blotch of an oval form; a dusky line crosses the base of the wing, followed by an undulated stripe. The under wings are of a greyish yellow tinged with rufous at their extremity, and fringed with yellow.

This species is subject to varieties of colouring. The caterpillar is fuscous, varied with black and white. It feeds on various plants, especially the black and white thorns: it moves slowly, and having eaten its fill, it quietly seeks the angle of a twig or branch for repose; and its colour blending with that of the bark of the tree, it is not readily detected. Generally four or five individuals are associated together. About the month of July it envelopes itself in a cocoon, sometimes among the leaves, sometimes on the ground. The moth appears at the end of September or the beginning of November.

5. The Sallow Moth (Xanthia Cerago); Xanthia fulvago, Stephens.

This species is common around London, and in other parts of England; and is spread on the Continent, but is more abundant in Germany than in France. It is subject to great variety. The anterior wings are always of a lively yellow, with marblings of a cinnamon colour, sometimes very decided, sometimes almost obliterated. The hinder wings are entirely of a dull white; and both these and the upper are of this hue underneath, with a wash of yellow on the edges.

The caterpillar is of a greyish brown; with a white longitudinal streak on each side of the body, and a black mark varied with white on the first ring. It lives principally on the birch, or on the willow, on the catkins of which it feeds till the leaves become developed. It assumes a pupa state protected by a cocoon of agglutinated earth. The perfect insect appears in August or September.

6. The Spotted Sulphur Moth (Erastria sulphurea). Perfect insect, caterpillar, and pupa. Erastria sulphuralis, Stephens.

The species forming the genus Erastria are amongst the smallest of the Noctuidæ, and are, in our island at least, as rare as they are beautiful. They are diurnal in their habits.

The present species, though common in the south of France, is one of our rarest British moths. It has been occasionally captured, Mr. Stephens assures us, in Battersea Fields, flitting amidst the flowers during daytime. It has also occurred near Margate, and in other parts of Kent.

This moth is very elegant. The head and thorax are sulphur yellow, with dusky black spots. The anterior wings are sulphur yellow, with three black spots on the anterior margin, and two on the disk. At their base two broad black bands run parallel with the inner margin, and, extending about two-thirds the length of the wing, are united by an undulating black line, often glossed with a silvery hue. Parallel to the latter is another waved line, sometimes interrupted; the hinder margin is irregularly black. The posterior wings are dusky black, with a whitish fringe.

The caterpillar is grass-green, with a black dorsal line, and a yellowish lateral streak. It feeds on the common field convolvulus, liseron des champs (convolvulus arvensis), and, according to Vieweg, on the ordinary willow. The perfect insect appears in July and August. In France, says M. Godart, it may be seen in abundance, flying in the bright rays of the sun over beds of thistles and fields of lucern, even in the environs of Paris. He remarks that there are two distinct varieties:—one of a beautiful green, with a black dorsal line, and a double white streak on each side of the body; the other has the body brown, without a dorsal stripe, and with the lateral lines yellow. The caterpillar undergoes its change in a slight tissue interwoven among the stems of grass.

7. The large Holly Moth (Sarrothripus ilicanus). This genus belongs to the Tortricidæ of Stephens, and is one of the most conspicuous in that family, not only for the comparative magnitude of the species, but from their habits. They are apparently autumnal, making their appearance at the close of summer, and sometimes continuing during the whole of the winter.

Mr. Stephens enumerates and describes seven species, but it is doubtful whether all are distinct; indeed, the

probability is that many, if not all, are only varieties, referable to S. ilicana. Such is the opinion of M. Godart, who regards the whole of the presumed species as identical, and refers them all to his Sarrotripe de Revay, or Sarsothripa Revayana. He observes:—"This species varies to such an extent, and some of its varieties are so decided in their markings, that Hubner, who has figured five, considered them as so many distinct species, and consequently applied to them distinct specific titles. But it is ascertained that all these varieties are to be referred to one species—the Revayana of authors."

The anterior wings are of a greyish white, more or less marbled with brown, and with a broad, transverse, brown belt; sometimes there are spots on each side of this belt—sometimes zigzag lines; the hinder wings are pale greyish brown, varying in intensity.

The caterpillar is of a pale green, with thinly set, long, white hairs. It is found at the end of June on the willow (Salix caprea). At the beginning of July, it constructs a cocoon, of a brilliant snow-white tissue in the form of a boat, truncated at one of its extremities; the moth appears in about three weeks. It is more common in the north than in the south of France. In our island it is not uncommon in some districts, and may be found in August at Birch Wood, Darent Wood, Coombe Wood, and other places of the same kind in Middlesex and Surrey. It has been taken in the New Forest. Many of the pupæ, as it would seem, pass through the winter in that condition, and undergo their change early in the spring, perfect insects having been taken in March. The same observation will apply equally to other species of moths which ordinarily appear late in the summer or in the autumn.

TOPIARY WORK.

One of the most striking characteristics of the old style of gardening in this country is the manner in which trees and shrubs were made to resemble in some degree various objects of nature or art. This was called *topiary work*, from the Latin word *topia*, which was the name given to any figure formed by cutting or arranging the leaves and branches of a tree or shrub. The Romans indeed seem to have been very fond of this mode of adorning their gardens, and the resemblances having frequently been produced by twisting and tying the branches with ropes and strings, they seem on that account to have adopted the Greek word *τοπια*, which signifies a rope. The Romans seem to have been so much attached to this tasteless mode of ornamenting their gardens that they had a distinct name, *topiarius*, for the gardener who performed the work, a name, *topiaria*, for the art, and another name, *topiarium*, for the work when done, whether arbour, clump, or anything else. It is probable that the fashion was adopted, not only in this country, but in France and other countries of the Continent, from reading the Roman writers, who frequently speak of such works in terms of admiration, and with the fashion we adopted the name. Pliny, in describing his Tuscan villa, mentions the forms of animals into which his box-hedges had been trimmed; and Madame de Staël states that the inhabitants of modern Rome still cut their trees into similar artificial forms. Our ancestors had the authority of classic Rome for this formal mode of embellishing their gardens, but for the fantastic and ungraceful mode of embellishing their own persons they were indebted to their neighbours the French and to their own perverted ingenuity—hoops, cocked hats, embroidered coats and waistcoats, high-heeled shoes, great wigs, and other tasteless modes of dress, were certainly not in any sense of the term classical.

The labour bestowed upon designing and executing topiary works will now-a-days be scarcely credited, nor can the perfection at which they arrived be easily conceived. Casaubon relates that somewhere in the neighbourhood of Paris he remembered seeing in his youth a piece of this kind of work so intricate that the siege of Troy was represented, with the contending armies and their generals. In a curious work, written by a German, who calls himself Laurembergius on the title-page of his treatise on horticulture, there is a description of a garden near Chartres where the Seven Wise Men of Greece and the Labours of Hercules were "elegantly" represented, accompanied by Latin verses framed out of living verdure. Nor was this all; for at the same place were the Three Graces, with an apposite motto, "Gratia gratiam parit" ("Grace begets grace"), and a representation of the heathen deities banqueting at one table, and the Roman at another. "When I beheld these things," said this German admirer of the topiary art, in a fit of rapture, "I was amazed at the ingenuity and industry of man, to which nothing forms an insuperable obstacle." Dr. Plot, in his 'Natural History of Staffordshire' (1686), alludes with no little complacency to the "pleasant walks and topiary works," then extant in the gardens of that county. "In the garden at Brerewood is a yew-tree that from divers branches issuing out of it about a yard from the ground forms a fair spacious arbour of a square figure, each side without measuring about five yards, but within not exceeding above ten foot, cut on the top with loop and crest, like the battlements of a tower adorned at each corner with a pinnacle, over which is wrought a canopy out of the middle branches about two yards in diameter, which is carried up again to a lesser gradation, and then terminates at the top in a smaller pinnacle. There is also near the pale inclosing the hortyard a fine yew-tree cut up gradually from greater to lesser rounds to the number of twenty, in which sort of ornament the people of this county seem to take great delight, there being others of twenty-one, twenty-two, and twenty-three stories high." The learned doctor also describes a yew-tree cut into the shape of a wren's nest, capacious enough to receive a man to sit on a seat made within it, and then speaks with becoming approbation of the tall clipped hedges at Pateshull, "the most accomplished and delicious mansion in the whole county." If these hedges were anything like the one at Sayes Court, over the destruction of which John Evelyn pours his lamentations, they must have made a striking exhibition indeed. The reader may possibly remember that Butler, in describing the "fringe and tassel" to the chin of his hero Sir Hudibras, upon which he lavished so much wit, declares that—

> "No topiary hedge of quick-set
> Was e'er more neatly cut or thick set,
> That made beholders more admire
> Than china plate that 's made of wire."

Although it must be confessed that these mechanic devices, by the extraordinary skill displayed in their execution, aspired in some measure to the character of a fine art, yet as the whole system of which topiary works formed part was constructed in direct opposition to the rules which nature adopts in planting her gardens, the system with its dependencies soon began to fall into disgrace. It was perceived that the proper duty of art was to become the handmaid of nature, not her tyrannical director. Lord Bacon, in that plan of a garden which forms one of his "Essays," condemns with emphatic conciseness this quaint tree-sculpture. "I, for my part, do not like images cut out in juniper or other garden stuff; they be for children." After Bacon, a whole host of writers attacked, both in prose

and verse, the prevailing style of gardening. Even in France, the nursery of all that is formal, the amiable Huet, Bishop of Avranches, had taste enough to prefer natural to artificial beauties, and to censure the opposite taste of the age. "Nothing is pleasing (we quote from his 'Pensées,' published after the Bishop's death in 1722) except it be costly. A spring of water bubbling up at the foot of a rock, and sending its clear fresh current over sparkling sand, will not give half so much pleasure to courtly people as a jet drawing its foul supplies at great expense from some putrid fen. A parterre framed after the design of Le Nostre, with no ornament beyond a few rows of box-trees that wear all seasons through the same monotonous colour, and surrounded by vast alleys of bare sand, such a place is the delight of polite persons. Let vulgar cits and peasants have their rural greens and mossy nooks; it is reserved for genteel folks to enjoy cropped hedges drawn up in regular file. Surely this is like preferring a face bedizened with paint to a countenance glowing with natural colour." Much about the same period our own Addison, with a correctness of taste which distinguished all he wrote, thus expressed himself:—"Our British gardeners, instead of humouring nature, love to deviate from it as much as possible. Our trees rise in cones, globes, and pyramids. We see the marks of scissars upon every plant and bush." I do not know whether I am singular in my opinion, but for my own part I would rather look upon a tree with all its luxuriancy and diffusion of boughs and branches than when it is thus cut and trimmed into a mathematical figure, and cannot but fancy that an orchard in flower looks infinitely more delightful than all the little labyrinths of the most finished parterre." Pope assailed still more pointedly the affectation of the age in this respect. His essay in the 'Guardian' reads like one of his satires done into prose. "I know an eminent cook who beautified his country seat with a coronation dinner in greens; where you see the champion flourishing on horseback at one end of the table, and the queen in perpetual youth at the other." He then enumerates some of the handiwork of a virtuoso gardener, in whom a love of sculpture was apparent, to wit, St. George in box; his arm scarce long enough, but will be in a condition to strike the dragon by next April. A green dragon of the same, with a tail of ground ivy for the present. A pair of giants, stunted, to be sold cheap. A quick-set hog, shot up into a porcupine by being forgot a week in rainy weather.

How much soever the old gardens savoured of the fickle fashion of the day, it is perhaps to be regretted that their eradication has been indiscriminate and almost complete. Few examples remain of the "pleasant walks" which were trod by a departed generation, or the "topiary works" where dames and cavaliers took shelter from the rain and sun. Fantastic though they were, there was a charm about their odd-shaped evergreens standing in close neighbourhood to the gable ends and quaint irregularities of antique mansions, which the keenest advocate for the march of improvement could not fail to perceive and enjoy. We hope it is unnecessary to explain that the feeling which would wish to guard from injury these relics of a past age, is not inconsistent with the conviction that the old method of adorning pleasure grounds is deservedly neglected. As patterns for imitation the "curious-knotted gardens" with their "trees cut into statues" are valueless; but as the works of an age that has become a portion of history they are extremely interesting, and in some instances perhaps worthy of careful preservation.

An instance of the French style of horticulture is to be found at Hampton Court, where the pleached arcade of beech excites universal admiration. The grounds at Haddon Hall in Derbyshire, and Stonyhurst in Lancashire, likewise retain their old designs. But the most perfect specimen of topiary work with which we are acquainted is at Levens in Westmoreland. At that place a profusion of yews, hollies, and other evergreens have been transformed into more shapes than Proteus would trouble himself to assume, unless he happened to be in a more than usually changeable humour. Here is Madame la Reine with her arms most royally akimbo, opposite to Monsieur le Roi bearing the semblance (we will not say how near) of a kingly crown. Not far distant are some trees like gigantic chessmen. The smaller shrubs, of which there is a vast number, greenly shadow forth cones, cubes, vases, foaming tankards, &c. The delicacy with which these objects are carved out of, or rather into, the foliage would amaze those who had previously seen nothing of the kind.

Autumnal Custom in Kordofan.—As soon as the harvest is concluded and the stubble is quite dry, the natives proceed to burn the remaining herbage. This occupation offers a very singular spectacle. The grass is in part collected into heaps, and old and young congregate around them to witness the exhibition which ensues: the pile is ignited, and a dense smoke issues from it. Disturbed by the fumes, and frightened by the noise of the multitude, thousands of locusts, which had lain concealed in the grass, fly up, but are quickly seized upon by the bystanders, impaled and roasted, and offered for sale in the market-place, at the price of five for one para or hassasch: they constitute a favourite dish with the natives, by whom they are greedily devoured. After this act of purification, the place again presents itself to view in all its nakedness, and many other matters come to light, which had hitherto been hidden by the grass: bones of men and animals lie scattered about in all the roads, for no one thinks it worth his trouble to inter them. The cause of this barbarity will be readily understood when it is known that, as soon as a slave dies, a rope is bound round his foot, by which he is dragged out of the hut with as little ceremony as a dead beast, and scraped into the sand anywhere, or even left to decompose in the grass until the hyænas come to gnaw his bones in the night; the remains are devoured in the morning by the dogs, two or more of which may not unfrequently be seen fighting over a human arm or foot. The hyænas are really in some respects a blessing to these countries: they are, in fact, the scavengers, consume all the dead bodies and garbage, and thus prevent the air from being poisoned with miasmata and nauseous vapours. A fallen animal is treated in the same manner as a dead slave: it is thrown on to the neighbours' territory, and is likewise devoured in the night by the beasts of prey; whilst the remainder is enjoyed during the day by the hungry dogs, in company with greedy vultures, eagles, and other rapacious birds. The places of sepulture are not held sacred by these uninvited guests; for the dead bodies being generally very superficially covered over with earth, they are disinterred at night by the hyænas and ravenous dogs, and totally consumed, or the remains are left exposed in the highroads.—*Travels in Kordofan, by Ignatius Pallme.*

The Gamboge-Tree.—The goraka, or gamboge-tree (goraka-gaha), grows to a great height, and has a very stately appearance, its small, dark-green leaves presenting a beautiful contrast to the light green of the other trees.—The gamboge is taken from the tree by incisions made in the bark. When thus cut, a yellow liquid, as thick as oil, runs down, and being exposed to the air, soon becomes solid. The fruit is as big as an apple, and deeply ribbed. In some trees it is yellow, in others red. When broken open, there are two seeds, which, to the teeth, feel like leather, and are surrounded by a scarlet-coloured, soft, and frothy pulp, of a pleasant flavour, but seldom eaten, as in eating it the teeth become covered with a substance resembling bees'-wax. An excellent jelly is made from it. The outside of the fruit is dried in the sun, and used by the natives in their curries. The wood is of little service. It is white and coarse. The fruit is ripe in July.—*Selkirk's Recollections of Ceylon.*



[Jonah.—From the Sistine Chapel.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXVIII.

Michael Angelo—*continued.*

We will now resume our sketch of Michael Angelo's life and works. When the Sistine Chapel was completed he was in his thirty-ninth year; fifty years of a glorious though troubled career were still before him.

Pope Julius II. died in 1513, and was succeeded by Leo X., the son of Lorenzo the Magnificent. As a Florentine and his father's son, we might naturally have expected that he would have gloried in patronising and employing Michael Angelo; but such was not the case. There was something in the stern, unbending character, and retired and abstemious habits of Michael Angelo, repulsive to the temper of Leo, who preferred the graceful and amiable Raphael, then in the prime of his life and genius: hence arose the memorable rivalry between Michael Angelo and Raphael, which on the part of the latter was merely generous emulation, while, it must be confessed, that something like bitterness and envy, or at least scorn, was mingled with the feelings of Michael Angelo. The pontificate of Leo X., an interval of ten years, was the least productive period of his life. He was sent to Florence, to superintend the building of the church of San Lorenzo and the completion of Santa Croce; but he differed with the pope on the choice of the marble, quarrelled with the officials, and scarcely anything was accomplished. Clement VII., another Medici, was elected pope in 1523. He was the son of that Giuliano de' Medici who was assassinated by the Pazzi in 1478. He had conceived the idea of consecrating a chapel in the church of San Lorenzo, to receive the tombs of his ancestors and relations, and which should be adorned with all the splendours of art. Michael Angelo planned and built the chapel, and for its interior decoration designed and executed six of his greatest works in sculpture. Two are seated statues, one representing Lorenzo de' Medici, Duke of Urbino, who died young, in 1519, living only to be the father of Catherine de' Medici (and, as it has been well said, "had an evil spirit assumed the human shape to propagate mischief, he could not have done better"). The other opposite, his cousin Giuliano de' Medici, who was as weak as Lorenzo was vicious. The other four are colossal recumbent figures, entitled the Night, the Morning, the Dawn, and the Twilight; though why so called, and why these figures were

introduced in such a situation—what was the intention, the meaning of the artist—does not seem to be understood by any of the critics on art who have written on the subject. The statue of Lorenzo is almost awful in its sullen grandeur. He looks down in a contemplative attitude; hence the appellation by which the figure is known in Italy—Il Pensiêro ("*the thought*"). But there is mischief in the look—something vague, ominous—difficult to be described. Altogether it well nigh realizes our idea of Milton's Satan, brooding over his infernal plans for the ruin of mankind. Mr. Rogers styles it truly "the most real and unreal thing that ever came from the chisel." And his description of the whole chapel is as vivid as poetry, and as accurate as truth, could make it.

"Nor then forget that chamber of the dead
Where the gigantic shapes of Night and Day
Turn'd into stone, rest everlastingly.
There from age to age
Two ghosts are sitting on their sepulchres.
That is the Duke Lorenzo. Mark him well!
He meditates; his head upon his hand.
What from beneath his helm-like bonnet scowls?
Is it a face, or but an eyeless skull?
'Tis lost in shade - yet like the basilisk,
It fascinates and is intolerable."

While Michael Angelo was engaged in these works his progress was interrupted by events which threw all Italy into commotion. Rome was taken and sacked by the Constable de Bourbon in 1527. The Medici were once more expelled from Florence, and Michael Angelo, in the midst of these strange vicissitudes, was employed by the republic to fortify his native city against his former patrons. Great as an engineer as in every other department of art and science, he defended Florence for nine months. At length the city was given up by treachery, and, fearing the vengeance of the conquerors, Michael Angelo fled and concealed himself: but Clement VII. was too sensible of his merit to allow him to remain long in disgrace and exile. He was pardoned, and continued ever afterwards in high favour with the pope, who employed him on the sculptures in the chapel of San Lorenzo during the remainder of his pontificate.

Clement VII. was succeeded by Pope Paul III., of the Farnese family, in 1534. This pope, though nearly seventy when he was elected, was as anxious to immortalize his name by great undertakings as any of his predecessors had been before him. His first wish was to complete the decoration of the interior of the Sistine Chapel, left unfinished by Julius II. and Leo X. He summoned Michael Angelo, who endeavoured to excuse himself, pleading other engagements; but the pope would listen to no excuses which interfered with his sovereign power to dissolve all other obligations; and thus the artist found himself, after an interval of twenty years, most reluctantly forced to abandon sculpture for painting; and, as Vasari expresses it, he consented to serve Pope Paul only because he *could* not do otherwise.

In representing the Last Judgment on the wall of the upper end of the Sistine Chapel, Michael Angelo only adhered to the original plan as it had been adopted by Julius II., and afterwards by Clement VII. In the centre of this vast composition he has placed the figure of the Messiah in the act of pronouncing the sentence of condemnation. "Depart from me, ye accursed, into everlasting fire;" and by his side the Virgin Mary: around them, on each side, the apostles, the patriarchs, the prophets, and a company of saints and martyrs: above these are groups of angels bearing the cross, the crown of thorns, and other instruments of the passion of our Lord; and farther down another group of angels holding the book of life, and sounding the awful trumpets which call up the dead to judgment. Below, on one side, the resurrection and ascent of the blessed; and on the other demons drag down the condemned to everlasting fire. The number of figures is at least two hundred. Those who wish to form a correct idea of the composition and arrangement should consult the engravings. Several of different sizes and different degrees of excellence are in the British Museum.

There can be no doubt that Michael Angelo's Last Judgment is the grandest picture that ever was painted; the greatest effort of human skill, as a creation of art; yet is it full of faults in taste and sentiment; and the greatest fault of all is in the conception of the principal personage—the Messiah as judge. The figure, expression, attitude, are all unworthy—one might almost say *vulgar* in the worst sense; for is there not profaneness and vulgarity both in representing the merciful Redeemer of mankind, even when he "comes to judgment," as inspired merely by wrath and vengeance'—as a thick-set athleta, who, with a gesture of sullen anger, is about to punish the wicked with his fist? It has been already observed that Michael Angelo borrowed the idea of the two figures of the Virgin and Christ from the old fresco of Orcagna in the Campo Santo; but in improving the drawing he has wholly lost and degraded the sentiment. In the groups of the pardoned, as Kugler has well observed, we look in vain for "the glory of heaven—for beings bearing the stamp of divine holiness and renunciation of human weakness: everywhere we meet with the expression of human passion, human efforts; we see no choir of solemn tranquil forms—no harmonious unity of clear grand lines produced by ideal draperies; but in their stead a confused crowd of naked bodies in violent attitudes, unaccompanied by any of the characteristics made sacred by holy tradition." On the other hand, the groups of the condemned, and the astonishing energy and variety of the struggling and suspended forms, are most fearful: and it is quite true that when contemplated from a distance the whole representation fills the mind with wonder and mysterious horror. It was intended to represent the defeat and fall of the rebel angels on the opposite wall (above and on each side of the principal door), but this was never done; and the *intention* of Michael Angelo in the decoration of the Sistine Chapel remains incomplete. The picture of the Last Judgment was finished and first exhibited to the people on Christmas-day, 1541, under the pontificate of Paul III. Michael Angelo was then in his sixty-seventh year, and had been employed on the painting and cartoons nearly nine years.

GEORGE PSALMANAZAR.

In the year 1703 it became known among the religious portion of the community in London, that a young man, a native of the island of Formosa, had been recently converted in Holland from paganism to the Church of England, and much interest was consequently excited concerning him. The Bishop of London, Dr. Compton, wrote to Mr. Innes at Sluys, who had the honour of making the convert, requesting them to come to England. Innes accordingly brought the young stranger, with the following certificate:—"We, whose names are underwritten, do certify that George Psalmanazaar, a native of the isle called Formosa, near Japan, and who has for some time been a soldier in the regiment of Buchwald, is now converted to the Christian religion by the charitable care and instruction of Mr. Innes, chaplain to the regiment of Lauder, God having so blessed his just designs that the said George, with all sincerity, hath renounced his pagan idolatry and

believed in Jesus Christ our Redeemer. And that since his conversion he hath behaved himself like a good Christian, and that his example has been edifying to all who have seen him. We, then, observing his integrity and many other of his good qualities, think him worthy to be recommended to all good people, and we pray them to succour and assist him in all his necessities, hoping that he will always be a true member of the church of Christ." Dated at Sluys, May 23, 1703, and signed by D. Buchwald, Colonel; De Vaudeuil, Lieut.-Colonel; W. J. Warnsdorff, Major: G. Laudier, Brigadier; and Abdias Hattinga, minister of Sluys, in the name of the Consistory.

Preceded by such reports and provided with such a certificate, the said George could not but make a considerable sensation in the literary and religious circles of London. He was of course incessantly questioned on topics connected with his native land, and, as he states in his preface, "Forasmuch as my account of it was entirely new, they thought it my duty to publish it; and I readily complied with their advice, both for my own ease and their satisfaction." The work* consequently appeared, and was dedicated to the Bishop of London, to whom he states that "the prevailing reason for this my undertaking was because the Jesuits, I found, had imposed so many stories and such gross fallacies upon the public, that they might the better excuse themselves from those base actions which deservedly brought upon them that fierce persecution in Japan: I thought therefore it would not be unacceptable if I published a short description of the Island of Formosa, and told the reasons why this wicked Society, and at last all that professed Christianity, were with them expelled that country."

It will be apparent that, for a stranger, he was at least extremely fortunate in selecting reasons for his publication which appealed so strongly to the curiosity, the prejudices, and the sympathy of those whom he addressed, and the tone of adverse feeling to the Roman Catholics, more particularly the Jesuits, is maintained throughout the work. For this feeling there may have been some personal cause. He acknowledges in his preface, that previous to his publication, "Father Fountenay, who is lately returned from China, having been eighteen years a missionary there," had endeavoured "by all means imaginable to destroy my credit." With this Jesuit he had a set conference before the Royal Society, on February 2, 1703, and met him on two other occasions, when, he says, he succeeded in silencing his objections, if not in convincing him. On the second meeting the father "wondered indeed to see me eat raw flesh, because, says he, the Chinese dress their meat after the same manner as the Europeans, though at the same time he confessed the Tartars differed from them in their cookery, for they only warmed their flesh before they ate it."

The work is divided into two books: the first, in forty chapters, contains the account of Formosa; the second gives his personal adventures and "his conferences with the Jesuits, and the reasons of his conversion." In the first book the geography and history were short and somewhat vague, but the account of the manners, customs, religion, and language was copious and interesting. It is true there were some statements of rather a startling character. To their deities eighteen thousand boys under nine years of age were annually sacrificed; infants were never suckled by their mothers, but by tame deer, goats, sheep, &c.: as soon as they are weaned, children are taught to smoke tobacco; snakes and vipers are esteemed dainties, "but to prevent being poisoned by the vipers, whilst they are alive we beat them with rods till they be very angry; and when they are in this furious passion, all the venom that was in the body ascends to the head, which being then cut off, they may be safely eaten;" colleges were numerous and well endowed, and Greek commonly taught; bloodletting was performed by the practitioner standing at a "little distance from the patient, and shooting small darts indifferently into any part of the naked body;" and many others. Objections were urged against these and other statements, to which Psalmanazaar replied in a preface to his second edition: and though the Jesuits still continued to denounce him as an impostor because he had attacked them, and Hidley, Dr. Mead, Dr. Woodward, and others continued incredulous as to a pagan becoming so learned a theologian, yet his work became an acknowledged authority, and was quoted in compiled accounts of Formosa, as late even as 1808, in the 'Bibliothèque Universelle des Voyages.' The account of the language was received by the learned of the day as perfectly satisfactory: it was found to be regular and grammatical, "a real language, and no counterfeit." The alphabet was of a peculiar character, and was written by the author with great readiness and facility.

In the second book is given his personal adventures, but the early part of his life is mentioned with a mysterious brevity. In Formosa he had had a tutor to teach him Latin, who pretended to be a Japanese, but was in reality a Jesuit. This Jesuit, Father de Rode, persuaded him to leave his home to visit Europe, and they made their escape in one of his father's vessels to Manilla, thence they proceeded to Goa, where they were entertained by the Jesuits. From Goa they departed for Europe, and arrived first at Gibraltar. Thence they proceeded to Thoulen, and travelled thence to Avignon. Here they resided in a Jesuits' college, and the efforts at his conversion became very strenuous, but his conviction revolted against the tenets, as he says, of the Catholic church, and being threatened with the Inquisition, he resolved to make his escape to Holland. He at length succeeded, though it would seem no very active search was made after him, as he walked from Avignon to nearly the source of the Rhône, and then down the Rhine to Landau, before he left the French territory, sometimes pretending to be a German, sometimes an Englishman or an Irishman. From Landau he crossed the Rhine into Germany, and proceeded down it as far as Andernach, where he was "pressed" for a soldier, though he pleaded being a Formosan and a pagan as an exemption. His plea was partly admitted, but pains were taken to make him a Catholic as well as a soldier. As they did not succeed, he received his discharge, and got as far as Cologn, when he was again seized upon by a recruiting party. On producing his discharge, and stating the reason, he was answered by the officer—"If others be fools, I am not; though you are a pagan, you may serve in the army as well as the best Christian." This regiment belonged to the Duke of Mecklenburg, and was hired to the Dutch. Two or three of the officers, including the colonel, were Lutherans; the lieutenant-colonel was a Frenchman and a Roman Catholic; the rest were chiefly Calvinists. This regiment was quartered

* 'An Historical and Geographical Description of Formosa, an Island subject to the Emperor of Japan; giving an Account of the Religion, Customs, Manners, &c. of the Inhabitants: together with a Relation of what happened to the Author in his Travels, particularly his Conferences with the Jesuits and others in several parts of Europe: also the History and Reasons of his Conversion to Christianity, with his Objections against it (in defence of paganism), and their Answers. To which is prefixed a Preface, in vindication of himself from the Reflections of a Jesuit lately come from China, with an Account of what passed between them. By George Psalmanazaar, a native of the said island, now in London. Illustrated with cuts and a map, 1704.'

at Sluys, where Lauder was governor and Innes was chaplain; and here a most vehement contest was carried on for the honour of converting the young Formosan, in which contest, as we have intimated at the commencement, Innes was successful. But Isaac d'Amalvi, pastor of the Walloon church at Sluys, published at the Hague, in 1706, a bitter complaint of the irregularity of Innes in converting and baptizing "a certain Japanese." He complains of Psalmanazar's misrepresenting their intercourse, misstating the arguments and unfairly attacking their doctrines, but no doubt is thrown on the fact of his being what he pretended. The young convert, for he was now only nineteen, became an object of general attention, and the Bishop of Loudon, as we have stated, sent him to Oxford. He at that time spoke and wrote Latin with great fluency, indeed his 'Historical Description' had been written in that language and translated into English; he understood Greek, and was evidently a man of considerable talent. At Oxford, after the publication of his book, he translated the Church of England Catechism and some other things into the Formosan language, which yet remain in MS. in the Bodleian Library.

[To be continued.]

An Elephant Hunt.—In those parts of the country where there are no horses, the elephants are caught in pits; but where the inhabitants possess horses, the following plan is pursued:—Two men, mounted on horseback, go hunting together, and generally pick out a full-sized elephant, because the larger animals prove the more profitable. When they have discovered an elephant, one man rides at a distance of about a hundred paces in front of him, so that he keeps in full view of the beast. The other rider approaches to within a hundred paces of the animal from behind, dismounts from his horse—for he is sure that it will stand quietly—stealthily approaches it from the rear, and with one cut with a sharp sabre severs the back sinews of its heel-joint. Infuriated to the utmost by the violent pain, and seeing the rider before it, the animal rushes instantly in pursuit of him, whilst the man who inflicted the wound gains time to vault upon his horse, and make off. The elephant cannot follow the rider far, partly because the latter has the advantage of a start—and the horse is, moreover, fleeter than the elephant—partly because he is, in a certain measure, lamed; thus he ultimately treads off his foot, and sinks exhausted with the loss of blood, an easy prey to the huntsman.—*Pallme's Travels in Kordofan.*

Attachment of the Arab to his Horse.—It is not always that the Arab is ready to part with his horse, if a good beast, whatever price may be offered; though money, among the degraded people of Morocco, will work miracles. A circumstance which proved this occurred to me about four years ago, when accompanying poor John Davidson some few days' journey into the interior. As we were proceeding between Mehedeea and Rabat we were joined by a troop of mounted Arabs, one of whom was riding a mottled gray, the handsomest barb I ever saw. Riding up to the man, I entered into conversation with him; and having put him in good humour by praising his steed, I told him I would make him rich if he would sell me the mottled gray. "What is your price?" said the Arab. I offered him a hundred and fifty *mitcals*, about twenty pounds sterling—a large sum in the interior. "It is a good price," said the Arab; "but look," said he—and he brought his horse on the other side of me—"look at this side of him; you must offer more." "Well, come," I said, "you are a poor man and fond of your horse, we wont dispute about the matter, so give me your hand. What say you? two hundred?" "That is a large price, truly," said the Arab, his eyes glistening; and I thought the horse was mine. But my eagerness, I suppose, had been too apparent; so the Arab thought I might still go further; and, shaking the bridle, off he went at full speed. The mottled gray curled its tail in the air and vanished to a speck in no time. I turned to speak to Davidson, and the next moment the Arab was by my side; and, patting the neck of his gray, he said, "Look at him—see—not a hair is turned! What will you give me now?" Davidson prompted me to offer even four hundred ducats rather than let him go. Again I began bargaining, and offered three hundred. On this the Arab gave his hand, and, thanking me, said—"Christian, I now can boast of the price you have offered; but it is in vain that you seek to tempt me, for I would not sell my horse for all the gold that you or any other man possesses." Having said this, he joined his companions. Calling the kaid, or chief of our escort, I asked him if he knew the rider of the gray; adding, that I supposed he must be rich, as he had refused so large a sum. The kaid said, "All I know is, that he is a great fool; for he possesses nothing in the world but that horse, which he bought when a colt, selling his tent, flocks, and even his wife, to buy it."—*Hay's Western Barbary.*

German Life.—What now, amongst the Germans strikes every liberal lover of his country, every man who has no motive but to see the truth and spread it, especially in our own beloved country? He sees a simple and less feverish state of existence. He sees a greater portion of popular content diffused by a more equal distribution of property. He sees a less conclusive straining after the accumulation of enormous fortunes. He sees a less incessant devotion to the mere business of money-making, and consequently a less intense selfishness of spirit; a more genial and serene enjoyment of life, a more intellectual embellishment of it with music and domestic entertainment. He sees the means of existence kept, by the absence of ruinous taxation, of an enormous debt recklessly and lavishly piled on the public shoulders, by the absence of restrictions on the importation of the articles of food, cheap and easy of acquisition. He sees, wherever he goes, in great cities or small towns, everything done for the public enjoyment. Public walks, beautifully planted, and carefully accommodated with seats at convenient distances for the public to rest at leisure. He sees these walks laid out wherever it be possible. Old town walls and ramparts are converted into promenades, commanding by their elevation the finest prospects over town and country. The whole of city or town is encircled by them. Thus, the old as well as the young can ascend from the heat and dust and hurry of the streets, and enjoy the freshest air, and the most lively and yet soothing scenes in the streets below on the one hand, or gaze into the green fields and hills around. It is delightful to see on fine days the greyheaded fathers of a city thus seated on these airy walks beneath their favourite limes, and enjoying their chat together over old times, while within a few steps of home their eyes can still wander over those distant scenes whither their feet can no longer carry them. If there be an old castle in the suburbs of any of their towns, it is not shut up, but its gardens, and its very walls, and courts, and fosses, are laid out in lovely walks, and the whole place is made the favourite resort and enjoyment of the whole population. There a coffee-house or casino is sure to be found; and there, beneath the summer trees, old and young, rich and poor, sit and partake of their coffee, wine, and other refreshment, while some old tower near is converted into an orchestra, and sends down the finest music for the general delight. He sees all sorts of gardens, even to the royal ones, and all sorts of estates, kept open for the public observation and passage through them; he sees the woods and forests all open to the foot and spirit of the delighted lover of nature and of solitude. He sees all public amusements and enjoyments, as theatrical and musical representations, the very highest of this kind, kept cheap and accessible to all. There are no operas there with boxes let at 300*l.* per annum, with seats in the pit at half-a-guinea each. Twentypence is the price of gentility itself; and for fivepence may be heard, and in a good place, the finest operas performed by the finest singers in the country. For fourpence may be attended the finest out-of-door concerts of Strauss or Lanner, in the capital of Austria itself. He sees education kept equally cheap in school and university, kept within the reach of all for the free use of all; and the school so systematised as to answer the various requirings of every varied class of profession. He sees the church kept cheap, and the churches open and free to one man as well as another, without pews and property, where all should be open, the common meeting-place of the common family before the common Father. He sees no church-rates imposed on stubborn and refractory consciences, but a voluntary contribution left to the voluntary attender of divine service. He sees musical and singing societies encouraged amongst the people, where the working-classes, when the labours of the day are done, can meet and enjoy a refining treat. He sees these civilising and refining influences extended over the open-air enjoyments of the Sundays and holidays of the common people in city and country.—*German Experiences, by William Howitt.*



[Tangier—from a

REMINISCENCES OF TANGIER IN 1836.

[From a Correspondent.]

[The public attention being at present called to the state of Morocco, we have thought that a slight sketch of the manners and customs of the people, as observed during a short stay at one of the principal sea port towns, would afford some useful information, and be not devoid of interest. Though the observations were made a few years ago, changes of manners in Africa are so rare, that they offer a sufficient picture of the present condition of the people.]

The sun was rising from the bosom of the blue Mediterranean, when the anchor of our *mistico* was weighed, her huge latteen sails run up to the mast-heads, and with a fresh breeze from the east she glided out of the little harbour of Tarifa, where she had lain during the night. The warm light had already caught the crumbling towers in the long line of Moorish wall which stretched along the shore—fortifications rich in the heroic associations of past ages, and records of British gallantry in our own time. As we passed the lighthouse and batteries on the rocky headland which shelters the harbour from the west, the lofty mountains behind the town rose into view, their crests covered with light fleecy clouds, assuming under the rays of the sun a brilliant whiteness. On the opposite side of the Straits a dense greyish vapour rested on the waves, concealing the African coast, except where Mount Abyla reared its black summit above the clouds. The sun and wind, uniting their influences, soon dispelled this mist, and the Barbary coast stood out in all its native blackness. On a nearer approach it assumed a less gloomy aspect; in many parts it was clothed with verdure; and where breaks in the dark cliffs allowed the eye to penetrate the interior, signs of cultivation were visible.

After a brisk run of several hours we doubled Cape Malabat—a low sandy headland on which is a small battery—and entered the Bay of Tangier, which stretches inwards to the south, bounded by lines of sand-hills. The town lies just within the western point of the bay, and here we came to an anchor, two or three furlongs from the shore, among a few similar small craft, fowl and bullock boats, which were all the shipping in the harbour. But in the bay lay two French ships of war, a two-decker of a hundred guns, and a double-banked frigate of sixty. The harbour, if such it may be called, is formed by a long ridge of rocks, scarcely visible above the waves, but serving to break the fury of the Atlantic during a northerly wind. This was once the Mole, and was levelled to the water's edge by the English on their evacuation of Tangier in the sixteenth century. Tangier, viewed from the bay, has a picturesque rather than beautiful appearance. Long lines of batteries present a formidable front to the sea; an extensive fortress crowns the high ground to the right; the houses of the European consuls an eminence to the left; and in the hollow between lies the town, from which springs the lofty square tower of the principal mosque, both in shape and adornments claiming kindred with the Giralda of Seville, and other Moorish towers of Spain.

It was 10 A.M. when we anchored, and the fierce rays of the sun were glancing from the white houses—brightening the national flags which streamed gaily from the roofs of the consulates—awakening the soft blue of the bay into a broad sheet of dazzling gold—and causing its girdle of yellow sands, dotted with figures in white, and trains of camels, to tremble with an excess of heat. The glare, the painful brilliancy of the scene, was truly African.

I jumped into the first boat that came alongside, and on approaching the shore two or three half-clad Jews rushed into the water, and offered their services to carry me through the surf. Mounting on the bare brawny shoulders of one, I was borne, like a prince of Tahiti, to the beach. Drawn up on the sand beneath the walls were the hulls of five large gunboats, built some years since in expectation of a rupture with Naples. In the shade beneath these were other human beasts of burden, squatting on the sand smoking cigars, or stretched in slumber till their services should be called for. As I was gazing around me, I was accosted in Spanish by a Moor, who offered to get my luggage through the custom-house, and to conduct me to an inn. He led the way to an open shed with three horse-shoe arches supported on slender pillars. Within, on an elevated bench, squatted the captain of the port, or chief officer of the customs. He was a venerable-looking man, with a long beard and mustachios of silvery whiteness, which contrasted strangely with his very swarthy complexion. His age, however, sat lightly on his gigantic and herculean frame. He wore a *haik*, or wrapper of white wool, in texture resembling bunting, which being

thrown back from his head disclosed a turban of white linen wound round the crimson fez, or *turboosh*; yellow morocco slippers, "a world too loose," as they are always worn by the Moors, half covered his tawny feet, which were thrust out from beneath the folds of his *haik*.

I had made my appearance before this functionary in an inauspicious moment, for he was assailing one of his men with harsh guttural abuse, and eyeing him with looks of unutterable wrath. As the old fellow sat there, his beard blown to and fro by the breezes, his large black eyes flashing with rage, and the muscles of his countenance working violently as he stretched forth his dark brawny arm with clinched fist towards the object of his wrath, he formed a study that would have rejoiced the eye of Michael Angelo.

While awaiting a cessation of this storm, my guide calmly squatted on the earth, and I had an opportunity of looking around me. On the same bench or platform as the enraged captain, but at right angles with him, and by his grave and tranquil manner forming a striking contrast, sat another Moor, also *à la Turque*. He was of even more gigantic proportions than the captain, and was similarly arrayed, but the fold of his *haik* was drawn over his head so as to conceal his turban and leave nothing visible but his face, black as that of a negro, though with features of the finest European mould, and with jetty mustachios and beard of no woolly texture. He appeared to be a clerk or secretary, for he had a pen in his hand, and a scrap of paper on his knee. The floor of the shed was bricked, and the wall was partially tiled in the manner so general in the Moorish edifices of Andalucia. Against it hung about a dozen muskets, with black stocks inlaid with ivory, and barrels of the extraordinary length of seven or eight feet.

My guide waited his time to introduce me to the captain, who, now softened down a little, ordered my luggage to be passed, received the fee demanded, and allowed me to depart. I followed my guide through a gateway in the walls, and through several filthy narrow streets, to the wretched inn kept for the accommodation of Franks by a Spaniard named Francisco Correa.

"It appears to me as if I should die with joy at the first landing in a foreign country. It is the nearest pleasure which a grown man can substitute for that unknown one, which he can never know—the pleasure of the first entrance into life from the womb." If a visit to France, Germany, or any other country of civilized Europe would have proved fatal to Charles Lamb, he would surely have died a score of deaths on the barbarous coast of Africa. To one who has never before quitted Europe, the first five minutes spent in Tangier will appear the most memorable of his existence. It is like entering a new world—all is so strange, so uncouth, so barbarous—a world peopled with ghosts, for to nothing human can the figures stalking about in white haiks be compared. The men, with their swarthy faces, dark flashing eyes, and enormous mustachios and beards, half lost in these sheet-like garments, might well embody the popular conceptions of the Genii of the 'Arabian Nights,' especially as they are of gigantic stature and sometimes of a most truculent expression of countenance; but the smaller figures, completely concealed in these shrouds, you might suppose either locomotive bundles of linen, or the spirits of the dead escaped from their sepulchres and made visible to mortal eye. You would never guess them to be living, breathing, ay, and often beautiful women. So enveloped are they, that if your eye chance to fall on one that is not moving, you can form no idea of the direction in which it is about to proceed. Yet many a costly robe, many a gem rich and rare, and what is more to be prized, many a lovely form, witching eye and velvet cheek, are shrouded by that white haik, and many a whiter foot is thrust bare into those red splay slippers.

Then the extreme narrowness, ruggedness, and filth of the streets, or alleys, as they should more correctly be called, and the lowness of the whitewashed walls or buildings on either hand, which bear no other resemblance to houses than in having wooden doors at intervals, and very rarely a small iron grated aperture instead of a window, add to the exceeding strangeness of the place. Should you, however, happen to meet—no unlikely thing—a camel whose projecting burden fills the narrow space between the walls, you will receive, unless you quickly bob your head, some sufficing evidence of being still in a material world.

But whoever would see the most of Moorish life that Tangier in a single point of view can present, should repair to the *sok*, or market-place, an open square just above the principal mosque.

Should it happen to be market-day, you will find this square thronged with figures: and what figures! —huge sons of Anak; few less, many much more than six feet in height; such a race as is not to be matched in civilized lands. Some with *haiks* thrown around them, like ancient togas, and no Roman patrician or knight ever did that garment more credit, or bore himself more nobly. Some in the *jelab* or *burnoz*, a brown striped cloak of coarse wool, with short sleeves, and peaked hood hanging behind, or thrown over the head, making the wearer resemble the victim of an auto-da-fé. Some in crimson *turboosh*, or cloth skull-cap with purple tassel; others in the true Oriental costume of turban, richly embroidered vest, and loose linen breeches tied in at the knee and girt about the waist by a sash of crimson silk. What grand black beards, what noble features, what commanding eye! And note their complexions: you expected to find the Moors a swarthy race, but many are fairer than Spaniards, though a few are tanned to almost a negro hue. True negroes there are too; slaves most of them, doomed in their own, as in other lands to "serve their brethren." Of a yet more degraded race there is no lack; you cannot mistake them—these sons of Israel—their servile, abject bearing would suffice to distinguish them from the Moors, nature's noblemen; but physiognomy and costume, black skull-caps and slippers, and black or blue caftans, the only garments they are allowed to wear, complete the distinction. These half-clad, sun-bronzed fellows, leading trains of laden camels through the throng, are Arabs, sons of nature and of the desert; smaller perhaps, but more flexible, wiry, and light-footed than the Moors. Here are children of both sexes; avoid them as abominations; they are either entirely naked, or have but a scanty frock on their filthy blackened bodies, and their heads are bare, scabby, and closely shaven, save where a long tail of hair springs from the right side of the crown, and depends behind in the Chinese fashion.* They are crowding round the fruit—huge piles of melons and oranges, and baskets of fresh figs, grapes, apples, pears, and plums, which cover the centre of the market-place. Observe those haik-wrapt figures, squatting under broad, flapping-brimmed hats of straw, which

* This fashion prevails, I believe, throughout the East. The Mohammedans adopt it in order that the angel Gabriel may have wherewithal to seize them, and save them from falling as they cross the bridge Al-Sirât, which spans Hell, and is finer than a hair and sharper than the edge of a sword. It prevails also among the Hindoos, being prescribed by the ordinances of Menu, but it does not appear to answer with them so useful a purpose.

cover them like umbrellas; they are peasant-women, and the guardians of the rolls of bread heaped up in baskets or spread out on the bare earth. Others are perambulating the market, with a number of ring-shaped loaves bracelets on their tawny bare arms. They are no way backward to show their charms, and to such as admire faces curiously tatooed, and sooty complexions, they are, doubtless, very Venuses. With the vanity that lurks alike under female skin of every hue, they seem particularly anxious to display their sable hands decorated with rude metal rings, and their nails stained with rosy henna.

Peasants of the other sex, in similar hats, but with sugarloaf crowns studded all over with tufts of variously coloured silk, are busied with long wicker hampers crammed with live fowls, from which they are selecting the fattest for a party of French sailors, caterers for fresh provisions. Some of the lowest Moors are carrying goat-skins on their backs, filled with water, and similar to the wine-skins of Spain, except that the hairy side is here turned outwards. On every side are Jew boys with baskets, embroidered leathern cushions, snuff tubes, straw hats, crimson turboosh-s, yellow and red embroidered slippers, and other articles of apparel, which they are hawking with all the pertinacity of their race.

The varieties of complexion among this motley crowd are infinite; in fact every shade from the finest European tint to that of the sootiest negro.

To enhance the strangeness of the scene, more *dramatis personæ* now enter the *sok*. From one side the two daughters of the British consul, returning from their morning ride, arrayed in hat and habit, and managing their fiery barbs with a skill and grace that would excite admiration in Hyde Park, and do call forth the unqualified amazement of the wild Arabs of the Desert, who must think the days of Ibla are returned. From the other side the market enter a couple of Moorish soldiers, mounted on chargers of the true Arabian grey, and shrouded in muslin-like haiks - a far more feminine attire to a British eye than that of the aforesaid ladies. In other respects their costume differs little from that of the civilians: but instead of the *turboosh* fitting closely to the head, it is raised several inches above it, and terminates in a peak; and the drawers, instead of being confined at the knee, extend to the ankle. Their saddles are of red leather, high-peaked before and behind, like the saddle of the days of chivalry, and precisely like that used by the Spanish bull-fighter of the present day. Their bridles terminate in a leathern thong for a whip, as frequently seen in Spain, and their stirrups are of the same trough-like shape worn in that country, but so short that the riders seem to sit upon their heels. As they urge their foaming chargers through the crowd, they encounter a train of asses, each bearing a single woolsack—no remarkable thing in general, but in this case of such enormous dimensions, that a dozen chancellors might sit on it all in a row, as it lies across the animal's back, almost smothering it beneath the mass. The horsemen rein up to allow the asses to pass, but their mettlesome barbs champ their heavy bits, and rear and plunge with impatience; and ere the last woolsack has passed, one of them, touched perhaps by the sharp corner of the stirrup which serves the purpose of a spur, starts forward, dashes against the sack, swings it round, upsetting the meek Dapple, its bearer, and sets off at full gallop up the street. The other horseman follows at the same pace, and away they go, their white *haiks* streaming wildly behind, and their long muskets raised like lances in the air.

[To be continued.]

Power of Vegetation.—In Mr. Waterton's Essays on Natural History there is a remarkable statement of a nut deposited for winter store by some nut-eating animal under an old millstone which lay in a field, springing up through the central aperture; and Mr. W. goes on to tell:—"In order, however, that the plant might have a fair chance of success, I directed that it should be defended from accident and harm by means of a wooden paling. Year after year it increased in size and beauty; and when its expansion had entirely filled the hole in the centre of the millstone, it gradually began to raise up the millstone itself from the seat of its long repose. This huge mass of stone is now eight inches above the ground, and is entirely supported by the stem of the nut-tree, which has risen to the height of 25 feet, and bears excellent fruit."

Italian Owls.—This diminutive rover of the night is prized by the gardeners of Italy for its uncommon ability in destroying insects, snails, slugs, reptiles, and mice. There is scarcely an outhouse in the gardens and vineyards of that country which is not tenanted by the civetta. It is often brought up tame from the nest; and in the month of September is sold for a dollar to spatsmen, who take it with them in their excursions through the country to look for larks and other small birds. Perched on the top of a pole, it attracts their notice, and draws them within the fatal range of gunshot by its most singular gestures; for, standing bolt upright, it emitses incessantly with its head somewhat inclined forward, whilst it keeps its eyes fixed on the approaching object. This odd movement is somewhat peculiar to the civetta alone. By it the birds of the neighbourhood are decoyed to their destruction. Hence its value to the ranging sportsman. Often and anon as the inhabitants of Rome pass through the bird-market at the Pantheon, they stop, and look, and laugh, at this pretty little captive owl, whilst it is performing its ridiculous gesticulations. Its flesh is relished by the natives of Italy. You may see the civetta, plucked and ready trussed for the spit, on the same stall at which hawks, crows, jackdaws, jays, magpies, hedgehogs, frogs, snails, and buzzards are offered for sale to the passing *connoisseurs*, who frequent the bird-market in quest of camal delicacies. The inhabitants of this country are apparently blessed with stomachs as keen and strong as that of my old black friend Daddy Quashi, who could fatten on the grubs of hornets and on stinking fish. Indeed, it would appear from what I have seen, that scarcely anything which has life in it comes amiss to the Italians in the way of food, except the Hanoverian rat; for I could often see this voracious and needy intruder lying dead in the streets, and trodden under foot.—*Waterton's Essays on Natural History.*

The Red Sea.—Towards evening, when the great heat had subsided, we used to row out in Captain Stuart's boat, to contemplate the wonders of the ocean, which only in that region have I beheld in all their beauty. Let the reader imagine, not far from the spot where the vessels ride at anchor, a perfect forest of coral, infinitely varied in form and hue, appearing through a sea blue as the Mediterranean, and smooth as the most polished mirror. Between these coral-branches and in the grottoes which they form, thousands of fish, more beautiful, more resplendent than any I have seen even from China, glide hither and thither, concealing themselves at the slightest noise; further on they become confounded in a wilderness of submarine plants. Beyond this again may be seen, two feet below the surface, a bank of sand, in firmness and whiteness unsurpassed, wherein, when the sea is unruffled, troops of porpoises may be descried, immovable, their bodies resting on their tails, half raised above the water, inhaling with open mouths the evening breeze. Not until you are close upon them will they take to flight, and even then move off so slowly that it must be with extreme regret. On one occasion an enormous ray-fish paid so little attention to the approach of our skiff, that I struck it with the oar before it would move. I am aware that the colours of fish seem far brighter when beheld through the medium of their natural element, and that their brilliance soon forsakes them when once out of water. I observed, however, when any were brought to me by the fishermen, that their forms were more varied, their hues richer, than any I have elsewhere seen. I regret exceedingly that I was unable to preserve any, having had neither the bottle nor spirits of wine necessary. However, the fish that live in the coral-beds form, I am assured, a very dangerous food, since many are esteemed poisonous.—*Fontanier's Journey to India and the Persian Gulf, by Egypt and the Red Sea.*



[Old Shoreham Church.]

RAMBLES FROM RAILWAYS.

THE ADUR, ARUN, AND WEY.—No. III.

OLD Shoreham is a poor place. Its inhabitants are nearly all fishermen, and they only possess a few cabins. It was once of some consequence, but the rise of New Shoreham, and the diversion of the mouth of the river by the accumulation of a sand-bank, have caused its utter decay. The church, which is the mother church of the county, is an interesting structure. It is often called Saxon, but is no doubt Anglo-Norman. It was conferred by the De Braose mentioned before as the owner of Bramber Castle, on the Abbey of Florance at Salmur, soon after the Conquest; but there is no evidence that it was erected by him; nor, we believe, is the date of its erection known. It consists of a nave, chancel, transept, and tower. The tower is in the centre of the church, rising from the intersection of the cross. It is supported on four large arches in the inside of the church; they are of great beauty—circular, and richly carved with the various Norman ornaments. There is a fine circular doorway in the south transept. The building has been suffered to go to decay, but is now being thoroughly repaired. As far as the repairs have proceeded, they appear to be judiciously performed; the restored portions seeming to be taken from neighbouring churches of nearly a contemporary period. The restoration of the edifice is being accomplished by subscriptions, the inhabitants being too poor to accomplish it unaided: a box is placed inside the church, into which the visitor may drop his contribution. An engraving of Old Shoreham church is given in Horsfield's 'History of Sussex,' but it is very inaccurate: there are only two windows on the south side, instead of three, and they are represented as pointed, instead of round; the doorway is also much too large, and altogether the character of the edifice is missed. The river is here, as we have said, of considerable width, especially at high tides; it is crossed by a wooden bridge five hundred feet long, and containing twenty-three arches. It is, however, rather awkwardly narrow, being only twelve feet wide; it is of no beauty. Since the erection of the bridge at New Shoreham the traffic over it is very much lessened.

The Adur probably emptied itself into the sea between Old and New Shoreham, but a sand-bank has been formed and gradually extended for some three or four miles along the shore, so that the river now runs parallel to the sea for that distance, and is only separated from it by a narrow strip of sand. As the encroachments of the sand lessened the depth of the river and caused the coast-line to recede from the old town, the houses would of necessity be built where more adapted to the convenience of traffic, and thus New Shoreham rose into being and consequence as the other decayed. But New Shoreham must have been a place of importance at a very early date. The church, which was collegiate, was of large size; and though not so large as in its original state—the greater part of the nave having been destroyed—it is even now one of the finest churches in Sussex. It is of the later Norman period: Dallaway says, there is every reason to suppose that it was erected in the reign of John, by the William de Braose mentioned in our account of Bramber Castle: it is remarkable as exhibiting a union of Norman with early pointed arches. Rickman, in his 'Attempt to discriminate the Styles of English Architecture,' says that "New Shoreham church is an excellent one for practical study, particularly when considered in conjunction and contrast with its neighbours Steyning and Old Shoreham." Of the importance of New Shoreham harbour at an early period it may be considered a sufficient proof, that when, in the reign of Edward III., the various ports were required to contribute ships of war properly armed, fitted, and manned, Shoreham was called upon to send twenty-six ships, while London only sent twenty-five. It is not a place of much consequence now: the accumulation of sand has carried the Adur some miles beyond New Shoreham, whose trade would have been quite destroyed thereby, if the evil had not been greatly remedied by the formation of the present harbour. A branch from the Brighton Railway has been carried to Shoreham, and promises to be of much service to the town. An elegant suspension-bridge has been thrown across the Adur here; it is from the designs of Mr. Clark, the engineer of that at Hammersmith, which it much resembles, but is ornamented with some large lions, the crest of the Duke of Norfolk, at whose expense the bridge was constructed. There are a few old houses in the town, but none to call for notice either as regards appearance or historic interest. It was at Shoreham that Charles II. embarked when he escaped from England after the battle of Worcester.

Thus, then, we have seen pretty nearly all the Adur has to show us; and now we will bid it good speed, and turn, as we arranged, towards the Arun. There are two ways of reaching that river—along the seaside, or across by the villages a little inland; we shall follow either as inclination may lead us, or there may be anything worth looking at to call us aside. The sea along this part of the coast does not put on its most attractive phase. There are no cliffs, and the shore is flat; so that at low-tide there is a long, dull, unbroken stretch of sand between you and the sea, extending in some places for a quarter of a mile. Still the sea is the sea, and it is worth a twenty miles' journey any morning only to inhale its refreshing odour, as every one feels who has been long absent from it. But we must hasten on, the limits of this paper and the ground we have to travel over telling us that all we can attempt is to act as an indicator—we can only venture to call attention to what is deserving notice, and perhaps now and then throw out a suggestion for the rambler to consider. Our way, if we keep by the sea, lies through Worthing; we leave the local guide-books to describe it. Everybody knows the appearance of a fashionable watering-place, with its long rows of tall, smart, white, naked, new houses, looking so fine in the sun with their fresh paint, spruce verandas, and bright green Venetian blinds; white-saddled donkeys and Bath chairs at the corners of the streets; and those queer things called bathing-machines on the sands. And everybody knows, too, how it looks with its human appurtenances—we confess we like to observe *them*, and indeed it is almost a matter of necessity to do so: of all dull places a watering-place is the dullest; and if it were not for the little relief that is obtained by observing the visitors, its dulness would be unbearable. Leaving, then, those who may visit Worthing to make their own observations upon it, we proceed to notice some of the villages we mentioned above.

At Broadwater, of which parish Worthing forms a part, there is a fine Norman church. The exterior is not remarkable, but the interior is very beautiful: it contains some arches richly carved; and in it are some rather splendid monuments to the De la Warr family. It will repay examination, and the key may be obtained close by. The walk from Old Shoreham to Broadwater, partly across the fields and partly by a country road, is a very pleasant one, and may be taken by those who do not wish to visit Worthing. It leads past Sompting, a thoroughly rural little village, with two or three old houses, and a church that should not be passed by without regard; its tower is one of the oldest in the country. Some years ago Mr. Rickman contributed a paper to the Society of Antiquaries, on the churches, &c. now existing that are known to belong to a period prior to the year 1000, which is published in their 'Archæologia,' vol. xxiv. He has only been able, after prolonged and careful inquiry, to name twenty of which any portion can be fixed on as certainly before that date, and these are scattered over thirteen counties. Sompting is one of them, and it may be worth while to quote his account of it, as it is brief, though somewhat dry, as, addressed to professed antiquaries, we might expect. After stating that the tower is the only part that was erected before A.D. 1000, and detailing at some length its construction, he goes on—"The tower is lofty, full one hundred feet to the point of the slated spire; it has four gables, very pointed, and thence arises the spire. The church is a cross church with no aisles, except an east aisle to the transepts; the north has three round piers and two arches, and the south one arch only; the whole of this is mixed with very late Norman and very early English, and appears all before A.D. 1200, except the wood-work of the porch, and perhaps its stone-work and some perpendicular inserted windows. On the whole this is a very curious church, and deserves to be studied with great attention." ('Archæologia,' xxiv. p. 45.) The rambler may see proof that the schoolmaster is not "at home" at Sompting; on a beer-shop there is painted in large letters, "deler in Meren Stors." To those who know that part of the country, such an inscription on such a house is suggestive of more than meets the eye. It is our strong conviction, from personal observation and knowledge in many parts of the country, and from some inquiry, that in secluded districts these beer-shops are most commonly serious evils: kept by any one who can raise two or three pounds, who occupies a house of a certain yearly value, and who is subject to little inspection, these houses are the resort and the meeting-house of the poacher, when situated inland, and of the smuggler, when near the sea; and in both cases they are a common medium for the disposal of their illicit gains.

A short distance on the north of Sompting is one of those earth-works of which there formerly existed a chain extending along the ridges of the South Downs; commencing at Bignor, midway between Petworth and Arundel, and ending at Mount Caburn, a mile or two beyond Lewes. This of which we are now speaking is called Cissbury, supposed to be a corruption of Cissa's-burg. It is an ancient encampment, of an oval form, of an area of about sixty acres, and is surrounded by a single vallum. It is a Roman work, but might, it has been thought, have been previously occupied by British troops. The view from the summit is very extensive, reaching from Beachy Head to the Isle of Wight. The eight or ten miles from Broadwater to Little Hampton are thickly strewn with small villages, each with it church; but there is little remarkable in them. Salvington, a hamlet forming part of West Tarring, was the birth-place of the learned and noble-minded John Selden. Fuller's notice of him, in his 'Worthies,' is in his quaintest style:—"His learning did not live in a lane, but traced all the latitude of arts and languages, as appears by the many and various works he hath written, which people affect as they stand affected either by their fancy or function. Lay gentlemen prefer his 'Titles of Honour,' lawyers his 'Mare Clausum,' antiquaries his 'Spicilegium ad Edmerum,' clergymen like best his book 'De Diis Syris,' and worst his 'Hystory of Tythes.'" On the west side of the neighbouring parish of West Ferring is another of the earth-works mentioned above. It is of an irregular form, and defended on three sides by a

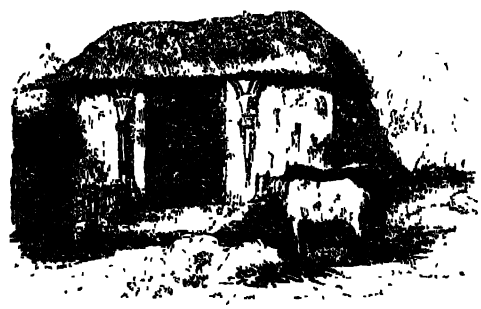


at Little Hampton.

vallation: from this also there is an extensive view, though not so extensive as that from Cissbury. But we mention it on account of its being the site of a whimsical folly. A miller, whose mill stood on the summit of the hill, contracted so strong an affection for the spot, that he resolved not to be separated from it even by death; and accordingly erected at its south-west angle a handsome altar-tomb, and surrounded it by a railing; and under it, as he directed at his death (1798), he was laid. It is one of the lesser "lions" of the neighbourhood of Worthing, from which place parties are, in the season, constantly formed to visit it: most of the hand-posts near the hill direct "To the Miller's Tomb."

We have now reached the Arun, a beautiful river, though its appearance at its mouth is not very prepossessing. Here, as all along this part of the coast, the shore is flat and shelving. At certain states of the tide ships of considerable tonnage can sail up the Arun as far as Little Hampton, which is nearly a mile from the sea. There is nothing very interesting in Little Hampton. It is a compound of a trading town and a watering-place; and each on a small scale. For its size, Little Hampton has a good deal of trade. The church, which is a neat building, is recent, but contains some portions of an older edifice. The Arun is here crossed by a floating bridge, much on the same plan as those at Portsmouth harbour and Southampton Water; this, however, is of a somewhat smaller size, and is worked by two men. If the tourist wishes to walk beside the river, he must cross by the ferry, and proceed along the left bank. The way is a pleasant one, and he may turn aside occasionally to look at some tiny villages and their churches (of which two or three are Norman) that lie very little out of his way. Or, if he prefer it, he may leave the river awhile and take some bye-roads a little on the left of the main road, and he will thus find a delightful ramble to Arundel. We will follow the river. We must not linger here, or we might point out many a pleasant bit of landscape and many of those little things that somewhat make amends for the lack of grandeur in ordinary scenery. It must be confessed that for a mile or more after leaving Little Hampton—say till we come in sight of Arundel—there is not much that is striking in our way. Yonder is Climping church, and it would be worth stepping aside to see, had we not stayed too long already. The little one before us is Ford. It is of the early English period, and looks older than it is, though some parts of it are anything but recent. This pleasing example of a rustic church stands close by the Arundel and Portsmouth Canal, which here joins the Arun. A little farther up the canal is Yapton church, which, to those who have any interest in ecclesiastical architecture, is perhaps worth a visit. It is an unpretending plain structure, with a Norman doorway.

Following the Arun for about three-quarters of a mile beyond Ford, we arrive at Tortington, whose church, though very small, is very interesting. It has several Norman arches, and one, that over the entrance door, is a rather rich one. We cannot say of Tortington church, as we did of Ford, that it looks older than it is; for it has lately had a new coat of whitewash. Cleanliness is a decent virtue, but it is a pity she flaunts her goodness on the walls of old churches. Somewhat farther up the river are the remains of the refectory of Tortington Priory. Tanner, in his 'Notitia Monastica' (Sussex), says that there was "at Tortington a priory of five or six regular canons of the order of St. Austin, dedicated to St. Mary Magdalene, and founded by the Lady Hadwisa Corbet, before King John's time." The only portion of the priory remaining is that mentioned above, a small part of the refectory, which is now used as a barn. Almost every trace of its original purpose is gone, and no doubt it will be very soon gone altogether. It is built of rubble and flints, and has a singularly old appearance. We give an engraving of it, as we are not aware that it has been engraved before, and it is hardly likely to be again. A few fragments of the walls of the old edifice remain; but the greater part of the materials were used for neighbouring buildings. The proprietor of the next farm told us that in making alterations recently in his house and premises, which adjoin the church, he found a great many carved stones, grotesque heads, &c. built up in the walls and other parts of his buildings. There are some noble elms hereabouts, which appear to have originally surrounded the priory grounds: the neighbourhood is delightful; and altogether we may judge that the old monks were well housed and agreeably situated.



[Portion of the Priory.]

GEORGE PSALMANAZAR.

[Concluded from page 312.]

THE residence at Oxford forms an epoch in the life of Psalmanazar. Walckenaer, in his account of him, in the 'Biographie Universelle,' says "his life was divided into two portions, which would seem hardly to belong to the same individual;" that in the last portion "he made himself dear by his piety and his virtue, and illustrious by his works, alike solid and important." The 'Penny Cyclopædia' states that a moral change came over him, and that "he applied himself intensely to study." The benevolent Dr. Johnson, the most tolerant of dogmatists, who knew him in the latter part of his life, said he never knew a man more mild, modest, simple, and excellent. We are sorry to be obliged to differ from these respectable authorities, but our readers shall judge whether we have cause. They are of course aware by this time that up to this point he was an arrant impostor, and his account of Formosa a complete though clever fiction. This was soon felt, though during his life he never expressly acknowledged it. He spent about twelve years at Oxford, supported chiefly by charity. In 1712 he became clerk to a regiment of dragoons, under the patronage of a major. In this situation he continued for two years, and still passed for a Formosan, calling himself Sir George, and pretending to have been knighted by Queen Anne. He then relinquished his post, and, driven to support himself by his own exertions, first had recourse to fan-painting at Bristol; then became religious, learnt Hebrew, translated the Psalms (which were published, dedicated to the Earl of Pembroke, in 1731); and commenced writing for the booksellers, contributing many articles to the work entitled 'Universal History,' all of them relating to ancient history. This sort of labour he seems to have pursued with sufficient industry to maintain himself comfortably. His labours, however,

were merely those of compilations, and the only productions of his pen which command any attention are—a real account of Formosa, compiled from the best authorities of the time, and published in the 'Complete System of Geography,' in 1747, but without his name; a volume of essays on scriptural subjects, and the translation of the Psalms already mentioned,—and these more from the circumstance of their authorship than from any characteristics of original thought or of "intense study." He at length died in London, in 1753, leaving what little property he had to his "dear friend" Sarah Rewalling, together with his MS. confession, which was published in 1764, under the title of 'Memoirs of * * *, commonly known by the name of George Psalmanazar.'

In this work he professes great and sincere remorse for the fraud he had perpetrated, and undertakes to give a true account of himself, but the statement has every appearance of a fiction not less gross, and more unpardonable, than the first. Nothing can be more vague than his statements. No dates, names, or places are given, though a great affectation of minute particulars is sustained. He pretends that these are suppressed out of reverence to his father and mother; and yet he does not describe them, and particularly his father, as very estimable persons. He says they were of decayed but noble families in the south of France, but had separated, and he was brought up by his mother, a zealous Catholic. He received his early instruction from two Franciscans in a free school, where he quickly learned Latin so well as to be shown off as the crack scholar. His teacher being appointed guardian of a convent in an archiepiscopal city, twenty four miles off, and in which was also a college of Jesuits, he accompanies him thither, studies, and makes wonderful progress. He then returns to his native city to study philosophy under a Dominican, who is attended by students from a university "about sixty miles off." The Dominican takes a liking to him, and wishes him to enter the order, which he says he would have done but for his mother, being then not more than thirteen or fourteen years of age. She consents, however, to his being sent to study theology at "the next university," in a city, "which was a noble, great one, full of nobility and gentry, of coaches and all kinds of grandeur, all which did greatly affect me, who had never seen so much by far of the beau monde, neither in my native city nor in the archiepiscopal one." Here he found himself associated with much older students than he had been accustomed to, and as he had hitherto always been at the head of his class, his vanity was wounded at finding himself placed below them. This is his excuse for passing a year in idleness, neglecting the lectures of the professors, and wandering about the country with youthful companions of both sexes, forgetting that he had just before stated that a similar situation in the archiepiscopal city had induced him to make extraordinary efforts, and secured him a success which he considered injurious as fostering his vanity. He left the university for Avignon, in the vicinity of which he procured a situation as tutor, then a second, then a third, and in this his mistress became enamoured of him, but being impenetrable to all her advances, he was dismissed, in extreme poverty, and had recourse to begging. He pretended to be a young Irishman driven from his country on account of having become a convert to Roman Catholicism, and in that character procured a pass from the superior of a convent as a pilgrim to Rome. He then stole a pilgrim's cloak and staff from the chapel of a saint, to whom they had been devoted, in mid-day and in the presence of several persons, and set out on his travels, begging so successfully in fluent Latin, that he might easily have saved money, but that he preferred spending it either in idleness or extravagance. On his road he visited his mother, who, he says, persuaded him to seek his father, at which he was surprised, knowing his father had been recently heard of as being in great poverty, but attributed the advice to his mother's affection for a cousin, though we do not see the reason of the suspicion, or what difference his going to his father, instead of Rome, could make. She, however, succeeds in persuading him, and, passing through Lyon, he finds his father *somewhere* in Germany. His father was too poor to maintain him, and he thought of again returning to his mother, but from this his father dissuaded him, and recommended him to travel, for reasons which he is not at liberty to mention, and which would certainly not be easy to imagine. He was now only sixteen, but it is here he determines to assume the character of a Formosan who had escaped from the Jesuits at Avignon. He avows that he knew little or nothing of China or Japan, but thought the plan "afforded a vast scope for a fertile fancy to work upon." He began, and says, "I have since had no small cause to wonder how I could excogitate not only such an alphabet and names of letters, but likewise many other particulars equally difficult, such as a considerable piece of a new language and grammar, a new division of the year into twenty months [this should be ten, - in this slip, he is followed by Chalmers*], a new religion, &c., and all out of my own head, in order to stuff them into that most abominable romance which I published soon after my coming into England, and which occasioned such a variety of opinions concerning it." He also exercised himself in writing this new language. He altered his Avignon pass, or rather forged a new one for the old seal, to suit his new character, and set out again for Rome. Being reduced to great distress, he attempted to enlist at Liege, voluntarily, but the officer took him to Aix-la-Chapelle, where, at a coffee-house, he attended customers as a waiter; sent as a message to his master, who was from home, he runs away, and reaches Bonn, where he again enlists, still passing as a Japanese, but is discharged as under size. He, however, succeeds in re-enlisting at Cologne, and is sent to Nuys, as has been already related. Of his pretended conversion the account is droll, whether true or false. Under his assumed character, and in his peculiar situation, he was at liberty to urge objections to the various disputants, of a novel character, and for which they were unprepared. Of Innes he gives a very indifferent character, saying he was "a man of no small ambition, though he was far from having any of the generous disposition which is mostly known to accompany it;" but acknowledges that, while being converted, "he seldom failed at our parting to clap a small piece of Dutch silver into my hand." He adds that Innes published a work, 'A Modest Inquiry after Moral Virtue,' for which he got a good living from the Bishop of London, but which he was "obliged publicly to disown and disclaim by the real author."

On his arrival in London, he states, he was continually urged to write the account of Formosa, and that it was done in two months, "so that it is no

* In the, the Religion of the Formosans, he had said, "The second part of the Jahabadiond begins with God's commands to Psalmanazar (the lawgiver of Formosa), saying, 'Thou shalt cause the people to divide the year into ten months, calling them by the names of the ten stars. . . . Every month shall have four weeks, and five of these months shall have thirty-seven days, viz., the first, third, fifth, seventh, and ninth, the other five shall have only thirty-six days. Every week shall have nine days, but in the months which have thirty-seven days, the last week shall have ten days, and the tenth day shall be a day of fasting.'"

wonder that the thing came out so crude, imperfect, and absurd; and more so would it have been, had not the person who Englished it from my Latin assisted me to correct many more improbabilities which I had not had time to discover; but he likewise was hurried on by the booksellers, and had the fewer opportunities of consulting me on that head." For the first edition he says he was paid ten guineas, and twelve for the second, which appeared in the same year with the first, with a preface replying to the objections to its genuineness.

At Oxford he does not seem to have profited much, but evinced the same character of indolence and vanity which had been displayed before, with the same tendency to fraud. "To make a show, at least, of retrieving the time I wasted abroad in the day-time in company, music, &c., I used to light a candle, and let it burn the greatest part of the night in my study, to make my neighbours believe I was plying my books; and, sleeping in my easy-chair, left the bed often for a whole week as I found it." He pretended this severe application injured his health, and that he had swelled legs, for which he was obliged to leave Oxford for a time. During his residence at Oxford he joined one Pattenden, who had invented a "sort of Japan" ware, in introducing it to the public under the name of "white Formosan-work," but it did not succeed. Even to the latest years of his life he continued aiming at exciting the public attention by deception. In his posthumous work, which, like the first one, is stuffed with what he would pass for religion, but in which a temporal aim is always discernible, the account he gives of his taking laudanum is so remarkable, that we give it at considerable length, though much abridged from the original:—

"It will be likewise necessary for me to give some account of that vast quantity of laudanum I have been known to take for above these forty years," and my motives for so doing, in order to undeceive such persons as may have conceived too favourable an opinion of that dangerous drug from anything they may have heard me say, heard at second-hand, or may have observed of the small visible hurt I have received from it, during so long and constant a use of it." He says his pretences—"easing the gout" (which he never had), helping study, &c., were all false—"my motive for taking it at first and continuing it so long, was no other than my vanity, and senseless affectation of singularity." To effect this, he says, "I own that I frequently took such large doses by way of ostentation as must have proved detrimental, if not quite fatal, to any man that had had a less strong and happy constitution than I was blessed with:" after many years' use, he began to feel the inconvenience, and "thought it high time to lessen the usual dose, which was then about ten or twelve tea-spoonfuls, morning and night, and very often more;" in six months' time he had reduced himself to half an ounce a day, "somewhat weaker than the common Sydenham," though he still affected to take the same quantity, mixing it with some other bitter tincture: the decrease brought on lassitude and other inconveniences. But when "Divine Providence was pleased to bless me with a contrary turn of mind, and to make me detest and abhor my former follies, and this among the rest, to such a degree as to resolve, by his assistance, upon a thorough change," he was enabled to discontinue it altogether, and abstained for some weeks "without taking one drop." But in the winter, he says, he was forced to resume it in smaller doses, and of this he says—"I have reason to think that that small quantity, though scarce equivalent to twelve drops of Sydenham's, hath been of some service to me to prevent that decay of spirits which old age (being now drawing near my seventieth), a sedentary life, and close study, might otherwise have probably brought upon me: and it is to this small dose, which I take every night in a pint of very small punch, as soon as I leave off writing, that I attribute, next to the blessing of God, that good share of health I have hitherto enjoyed."

If what we have given proves, as we think it does, that the man was never sincere, and that we yet know nothing of him beyond his works and his life in England, what a melancholy spectacle is exhibited. With indisputable ability, a vast facility in acquiring language, a copious invention, he prostituted them all to the acquisition of notoriety, when they were sufficient to ensure fame. It may be a useful lesson to guard against the influence of an inordinate vanity, to which he himself, indeed, attributes all his calamities, and which apparently he could never conquer.

The Romans and the Northmen.—Two nations only have left permanent impressions of their laws, civil polity, social arrangements, spirit and character, on the civilised communities of modern times—the Romans, and the handful of northern people, from the countries beyond the Elbe, who had never submitted to the Roman yoke, who, issuing in small piratical bands, from the fifth to the tenth century, under the names of Saxons, Danes, Northmen, plundered, conquered, and settled on every European coast, from the White Sea to Sicily. Under whatever name, Gothi, Visigoths, Franks, Anglo-Saxons, Danes, or Northmen, these tribes appear to have been all of one original stock—to have been one people in the spirit of their religion, laws, institutions, manners, and languages, only in different stages of civilization, and the same people whom Tacitus describes. But in Germany the laws and institutions derived from the Roman power, or formed under it after the Roman empire became Christianized, had buried all the original principles of Teutonic arrangements of society as described by Tacitus; and in France the name was almost all that remained of Frank derivation. All the original and peculiar character, spirit, and social institutions of the first inundation of this Germanic population had become diluted and merged under the church government of Rome,—when a second wave of populations from the same Pagan north inundated again, in the ninth and tenth centuries, the shores of Christendom. Wheresoever this people from beyond the pale and influence of the old Roman empire, and of the later church empire of Rome, either settled, mingled, or marauded, they have left permanent traces in society of their laws, institutions, character, and spirit.—*Laing's Chronicles of the Kings of Norway.*

Pig-killing at Rome.—As you enter Rome at the Porta del Popolo, a little on your right is the great slaughterhouse, with a fine stream of water running through it. It is probably inferior to none in Italy for an extensive plan and for judicious arrangements. Here some seven or eight hundred pigs are killed on every Friday during the winter season. Nothing can exceed the dexterity with which they are despatched. About thirty of these large and fat black pigs are driven into a commodious pen, followed by three or four men, each with a sharp skewer in his hand, bent at one end, in order that it may be used with advantage. On entering the pen these performers, who put you vastly in mind of *assassins*, make a rush at the hogs, each seizing one by the leg, amid a general yell of horror on the part of the victims. Whilst the hog and the man are struggling on the ground, the latter with the rapidity of thought pushes his skewer betwixt the fore leg and the body, quite into the heart, and then gives it a turn or two. The pig can rise no more but screams for a minute or so, and then expires. This process is continued till they are all despatched, the brutes sometimes rolling over the butchers, and sometimes the butchers over the brutes, with a yelling enough to stun one's ears. In the mean time, the screams become fainter and fainter, and then all is silence on the death of the last pig. A cart is in attendance; the carcasses are lifted into it, and it proceeds through the street, leaving one or more dead hogs at the doors of the different pork-shops. No blood appears outwardly, nor is the internal hemorrhage prejudicial to the meat, for Rome cannot be surpassed in the flavour of her bacon or in the soundness of her hams.—*Essays on Natural History, by Charles Waterton.*



[Interior of the Chapel Royal, St. James's.]

THE CHAPEL ROYAL, ST. JAMES'S, AND ST. JAMES'S PALACE.

The Chapel Royal is properly a private chapel belonging to St. James's Palace, of which it forms a part, and is in strictness designed for the use of the Royal Family and household, though others are admitted to its sacred services by favour or fees. It is situated between the two northern gateways, forming a part of the range of buildings which separates the eastern quadrangle from the larger area to the west. The chapel is small, and somewhat plain in its style of decoration, except the ceiling, which is wrought in plaster panels, and is supported by a frame-work of wooden ribs, not resting upon the walls, but suspended from the roof. The panels are decorated with heraldic paintings, having Tudor ornaments in the centres, the arms emblazoned in their appropriate colours, and the subjects gilt and shaded with brown. The mouldings of the ribs are painted green, with a running ornament of gold. The general effect is exceedingly rich. The services of the Chapel Royal are similar to those of cathedrals, and the establishment consists of a dean, priests in ordinary, chaplains, gentlemen of the Chapel Royal, organists, choristers, and other officers. The present chapel was fitted up by Charles I., but, judging from the style of decoration of the ceiling, there is no doubt that the room was originally furnished by Henry VIII. without any reference to sacred uses. Charles I. attended divine service in it on the morning of his execution, and afterwards "walked through the park guarded by a regiment of foot to Whitehall." It has continued from that time to be the place of worship for the royal family when in London; but a private chapel has for some time been established in Buckingham Palace, and the attendance of Queen Victoria at the Chapel Royal, St. James's, has since become comparatively rare. The Chapel Royal was enlarged in 1836, by Sir Robert Smirke, and the ceiling has been repaired several times.

St. James's Palace was built by Henry VIII. on the site of the Hospital of St. James, which was founded for "fourteen sisters, maidens, that are leprous, living chastely and honestly in divine service." In 1532 Henry purchased the ground and buildings of the hospital, turned out the sisterhood, allowing them pensions, pulled down the hospital, and built the palace. The plan is said to have been furnished by Holbein, and the erection to have been superintended by Cromwell, Earl of Essex. It was called St. James's Manor-House, and was then quite in the country. A good deal of the original manor-house remains, both internal and external. The gateway-tower, or gate-house, facing the bottom of St. James's-street, with its four octagon towers at the corners, each with a low arched door, and windows little larger than loop-holes, remains unaltered except in the renewal of the windows over the gateway. Other towers and portions of exterior wall are to be seen in connection with portions which have been rebuilt in the original style, and additions in other styles not at all in accordance with that of the old building. The whole of the buildings are of brick, with little regularity of plan that can be traced at present. The style of the original structure is castellated, with battlements on all the towers, parapets, and walls; but having been built when civil disturbances had long ceased, they had never much strength.

St. James's Palace continued to be a royal residence of rather private character till the burning of Whitehall in 1698, when it became not only a royal mansion, but the chief place for holding levees and drawing-

rooms. It was the favourite place of residence of Charles I., and he made several additions to the buildings. Anne, George I., and George II. resided almost constantly at St. James's. Buckingham House was the town residence of George III., but levees and drawing-rooms were held at St. James's, as they still continue to be. There is indeed no exterior show of the splendour which, on occasions of state ceremony, is displayed within its walls. The soldiers who stand sentinel in the courts and at the entrances are almost the only indications of there being anything royal about the place. No stranger would ever suppose that these brick buildings, without any architectural pretension except the old gate-house with its towers, was the far-famed "Court of St. James's," whose influence and power have been acknowledged in every part of the civilized world. As a record of that court, and as connected with many an interesting historical fact, we should be sorry to see the old gateway-tower pulled down, whatever may become of the rest of the buildings, when, at some future period, the glories of that court may possibly have been transferred to some more favoured palace.

The state-apartments, though few, are magnificent. They look towards St. James's Park, with the garden intervening. They are entered by a passage and staircase of great simplicity, which lead to a gallery furnished as an armoury. A small chamber, or anteroom, hung with fine specimens of tapestry, conducts to the three principal state-apartments. The last of these three apartments is the Presence Chamber, in which the compartments over the arch of the chimney-piece are ornamented with Tudor badges and the initials H. A. [Henry-Anne] united by a knot, whence it is inferred that this room is a part of the original Manor-House, which was built by Henry when Anne Boleyn was his queen. These three state-rooms are furnished in a style of the utmost richness and splendour. Plate-glass mirrors,

> "in which he of Gath,
> Goliath, might have seen his giant bulk,
> Whole without stooping, towering crest and all;"

chandeliers, lustres, and candelabras of the most gorgeous workmanship; hangings of crimson velvet; ottomans, sofas, and stools covered with the same rich material and trimmed with gold lace; window-curtains of crimson satin; gilt cornices and mouldings; marble slabs and ornamented chimney-pieces—present, when blazing with lights and crowded with the beauties of England in their most superb attire and sparkling with gems, a scene of splendour which imagination would vainly endeavour to picture. The throne in the Presence Chamber is magnificent. There are two or three other apartments belonging to this suite, which are very superbly furnished, and are also used on occasions of state ceremony.

THE PRECIOUS METALS IN RUSSIA.

Russia is every year becoming more remarkable for the quantity of the precious metals found in the eastern parts of the empire. Whether the day will ever arrive that it will supersede South America in these respects, the future must show; but there are already districts in Siberia in which a considerable degree of prosperity is manifested, by the busy commercial arrangements to which these mineral riches give rise. We will shortly sketch the outlines of the mining system adopted, from the information obtained by Mr. Cottrell, one of the most recent English travellers in Siberia.

Most of the silver found in the Russian dominions in the emperor's private property, and is worked under his orders; but the gold is left to individual speculation. The arrangements in respect to gold are curious. Every free man in Russia, except persons in the employ of the government, is allowed to search the sands for gold, and to make or mar his fortunes according to his degree of success. As soon as any one has investigated the district where he purposes to make the search, and has satisfied himself that appearances are favourable (from finding perhaps a few grains of the precious metal), he is obliged to announce the discovery to the nearest public functionary. The next step is to make application to the director of the nearest mining department belonging to the crown, for leave to begin his undertaking. An officer of the mines is upon this sent to measure out the ground, which is limited by law to five square versts (a verst is about two-thirds of an English mile). This spot is assigned to the person in question for as long a time as he chooses to occupy it; during which period he is practically the proprietor, and pays no rent to the government.

When all the arrangements are made, the speculator proceeds to erect huts for the workmen, and the machines for washing the sand which is supposed to contain gold. The only condition annexed is, that whatever gold he finds, must be immediately conveyed, after the season of work is over (the beginning of October), to a government dépôt at the town of Barnaoul, in Western Siberia, between Tobolsk and Irkoutsk. Here certain arrangements, which we shall describe farther on, are carried into effect; having for their object the assumption of a certain degree of government control over the final disposal of the gold. The workmen whom the speculator employs are chiefly persons who have been banished from Russia, and who receive from the police a stamped permission to reside on the spot, for the term of one year; the permission being renewable at the end of that period. As the number of speculators is yearly on the increase, the price paid for labour has risen considerably within the last few years. The workman receives in hard money about eighteen roubles a month, (a rouble is worth about three shillings and threepence English); in addition to which he is lodged, fed, and provided with tobacco and brandy, which are in fact luxuries to him. Some of the establishments are two or three hundred miles from any large town, and far from any high road, so that flour, meat, fish, and other necessaries must be conveyed on horseback; the actual cost of each labourer to the employer is, therefore, very high indeed, and could not be supported without the expectation of large profits.

The gold is not found in a mine or combined with masses of rock; the sand of a particular district is collected, and by careful washing it is found to yield grains and small fragments of gold, which are separated from the sand. This auriferous sand is found in many parts of Siberia. For instance, the government of Omsk, which was not previously known for its mineral riches, yielded in 1840 three hundred pounds of the precious metal. This was found on the steppes, or plains, which are inhabited rather by the Kirghis Tartars than by the Siberians or Russians. When a speculator thinks that any particular spot on these plains will yield gold, he hires it from the Kirghis at a fixed yearly rent; and whenever he discontinues his operations, the land reverts to the owner, who finds it in a more cultivable state from being cleared of the sand.

When a speculator has accumulated a sufficient quantity of gold from his sand-washings, or when the season for operation is over, the intervention of the government takes place in the following manner:—Each proprietor brings his gold in bags to Barnaoul;

the dust, the small pieces, and sometimes masses weighing several pounds, being mixed up indiscriminately in the bags. These are weighed in the presence of the proprietor and the chief of the establishment, and the quantity registered. Then the gold is melted down into ingots. It is put into large cast-iron pots, previously brought to a red heat, and the pots with their contents are exposed to the heat of a furnace for forty minutes, by which the gold is brought to a liquid state. The liquid gold is poured into quadrangular iron recipients, or ingot-moulds, which contain one pud or pood, if there is this quantity of gold belonging to one person (a pud is equal to forty Russian pounds, or about thirty-six English avoirdupois pounds). The ingot is weighed, to see what it has lost by passing through the fire; and then the gold is assayed and its value fixed according to the carat. The average loss in the melting is one and a half per cent.; but it is occasionally as much as two or three per cent.

As in most despotic countries, where the officers of the government are responsible only to the emperor, a system of fees and presents is extensively carried on. The chief of the establishment at Barnaoul is said to enrich himself rapidly; for as it depends greatly on him to fix the value of the gold, the proprietor deems it to be his interest to keep on good terms with this official. Mr. Cottrell remarks—"We have seen, the greatest count paid to individuals on whose report so much depends. It is said that there are persons much higher in authority than even he is, who have their share of these largesses; and if the system is so corrupt throughout, the revenue must lose considerably. It stands to reason that large sums cannot be expended every year in presents to governors and others, unless the gold is rated higher than its real worth: for otherwise there would be no object to gain, and it (the present to the chief) would be all dead loss. But where no one is allowed to get rid of his gold but through this channel, the temptation to fraud is great, and smuggling even goes on at Barnaoul. Gold is frequently bought, for something under the price the government allows, by other proprietors who have a quantity to send to head quarters. The smaller proprietors save by this means the expense of carriage and presents to the different officers, and so it comes to pretty much the same to them; perhaps, too, they have never had legal permission to search for it. Before this can be done, application must be made to government for a grant of the land on which it is proposed to work, and this is attended with some little expense, which he escapes by disposing of the gold surreptitiously to those who have authority to search for it."

When the weighing, the melting, the assaying, and the registering are completed at Barnaoul, the government takes upon itself the expense of conveying the gold to St. Petersburg, whither it is sent three times in the year, and lodged in the royal mint. It is then coined, and the government receives out of it a tax of fifteen per cent. for the cost of transport and carriage. The remainder is paid back to the proprietor, who generally finds that the presents which he has had to make, together with the tax, amount to about one-fourth of the registered value of the gold.

The enterprise of a gold speculator is a very uncertain one. If it is fairly successful, the expense of working is about one-fourth the full value of the gold; and this, added to the fourth just spoken of, leaves to him one-half clear profit. But it is not unfrequent to find a speculator wholly unsuccessful in his search, the sand not containing enough gold to pay the current expenses; in which case the individual is often brought at once to poverty. Mr. Cottrell gives details of a few examples to illustrate the uncertain nature of the speculation, which we may give here in a condensed form.

About twelve years ago a Russian gentleman, M. Astaschef, retired from the service of the government, having been employed in the office of the finance minister. He wished to become a gold speculator; but as he could not do so while in the employ of government, he resigned his situation. Before the year 1829 very little gold had been found to the east of the Ural Mountains; but in that year a merchant at Tomsk, named Popof, who was already possessed of a very considerable fortune, heard accidentally that a deserter, concealed in the woods a hundred miles east of the town, had found gold in the sands. Popof found means, first, to discover the spot, and then to obtain a grant of it from the government. At first he was not very successful, the produce being only about half a *zolotnik* to a hundred puds of sand washed (one part of gold in four hundred thousand parts of sand). He then changed the theatre of his speculation, and removed his establishment more than a thousand miles northward of Tobolsk; here he found gold, but not in great quantities; and as the soil there is constantly frozen, the expense was very great, independent of the difficulties attendant on the scarcity of workmen, houses, and provisions. After having spent in all sixty-three thousand roubles, and searched in no fewer than three hundred different spots, he returned to the place first selected, and succeeded in obtaining a better return for his labours.

This merchant lent forty thousand roubles to M. Astaschef, to commence his speculations. A third person, who had spent two hundred thousand roubles fruitlessly in search of gold, at length found a small river on whose banks gold was mixed with the sands; and he and M. Astaschef agreed to divide it between them, each taking one bank. The speculation turned out well, the proportion of gold to sand being twice as much as that which Popof had procured. After this they formed a Company, together with several of the first personages at St. Petersburg; the management resting with Astaschef and Riazanof, while the others provided influence and additional capital. Many of these persons, however, were of the class to whom this kind of speculation was forbidden; and on a hint from the emperor they sold their shares in the Company to M. Astaschef.

In 1841 M. Astaschef was reputed a *millionaire*. The place where this fortunate spot was found is in the government of Yenisseik, near the rivers Touba and Kan. He was also one of the owners of another establishment on the frontiers of the two governments of Irkoutsk and Yenisseik. M. Astaschef told Mr. Cottrell that this second establishment yielded sixty-nine puds of gold in 1840. "The immense quantity of sand," says Mr. Cottrell, "which must have been washed to produce this golden result is something almost incredible; and what is more, there is no assignable limit to the riches of this individual, who is under fifty years of age; for there is every probability that not only the sands where they now are at work will not be exhausted for fifteen or twenty years, but that many other spots in the neighbourhood may be equally full of treasure."

When the gold has been coined at St. Petersburg, and the fiscal deductions made, the proprietor has the option of receiving the remainder either in coin or in assignats. So critical is this gold-seeking occupation, that even M. Astaschef, highly successful as he has ultimately been, narrowly escaped failure at the outset; for of the forty thousand roubles which he borrowed to commence operations, thirty five thousand were expended before he met with any success.

The silver-mining system we must notice in another article.

[To be continued.]

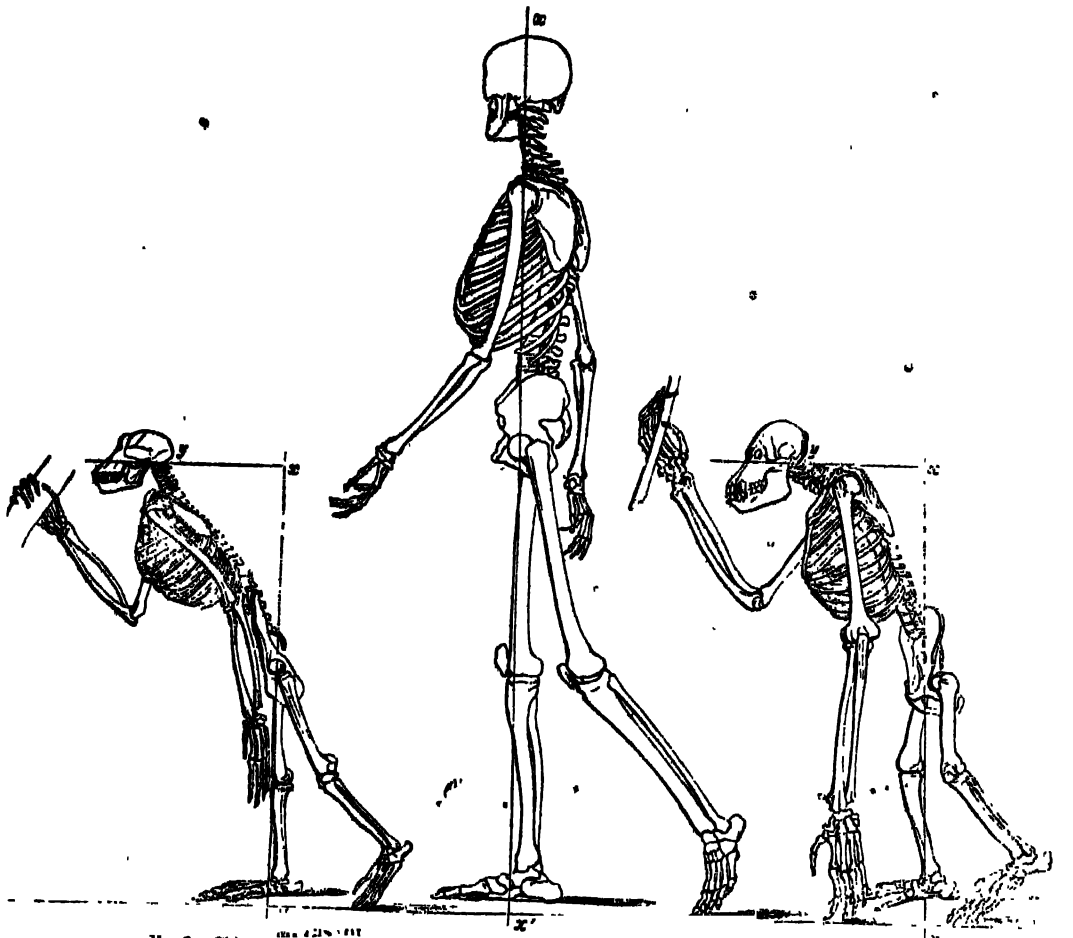


Fig. 2.—Chi

Fig. 1.—Man.

Fig. 3.—Orang-utan.

[Skeletons of Man and Monkeys.]

LOCOMOTION OF ANIMALS.—No. VIII.

Having given an outline of the mechanism by which the human race perform their movements from place to place by means of their locomotive organs, and having also detailed the leading principles by which these movements are effected, we shall now turn our attention to the means and methods by which the locomotion of animals inferior to man in the scale of organization is performed. It will be convenient to take in succession the lower animals in classes as grouped by zoologists, and begin with those which are most nearly allied to man. It is true that by this arrangement we shall have to pass from bipeds to quadrupeds, and trace our steps back again to bipeds; but these objections will not embarrass our subject, as would the grouping together of animals of widely different classes whose organs of motion are very dissimilar, although they perform movements which involve some of the laws common to each. In following the plan already indicated, we arrive at a group of animals which excite no common degree of interest in the minds of zoologists, namely, the Quadrumana. If we take a glance at the solid bony framework, as represented in *Figs.* 1, 2, 3, we shall at once see, without being acquainted with anatomy, that the general outline is nearly the same in all the figures, and that there are many parts in common, or having bones of similar figures in each of the three skeletons. Upon closer inspection, however, we shall perceive that some bones are common to the three: some have additional bones, such as an extra pair of ribs; other bones, again, are common between *Figs.* 1 and 2, 1 and 3, and 2 and 3. On comparing heads in *Figs.* 4, 5, and 6, we observe that the face and jaws are much more extended anteriorly in the chimpanzee (*Fig.* 5) than in man (*Fig.* 4), and that they are still further prolonged in the orang utan (*Fig.* 6): the proportion in each may be obtained by taking in each case the length of the lines $x\,y$. We see also that the forehead is lower and the head flatter in the orang, and still more so in the chimpanzee. The head of each turns by a hinge-joint on a pivot at y; and in the erect position the distance of $x\,y$ is least in man, greater in the chimpanzee, and greatest in the orang: and, as the force necessary to support the head in standing erect is proportional to the weight of the parts multiplied by their distance from the axis of motion in the direction of these lines, it follows that the power to support the head is least in man, and greatest in the orang-utan. Again, we see that the proportions between the length of the arms and legs are different in each; the arms are longest in proportion to the height in the orang, shorter in the chimpanzee, and shortest in man. The legs are longest in man, less in the orang, and least in the chimpanzee. In the orang we observe that the arms nearly

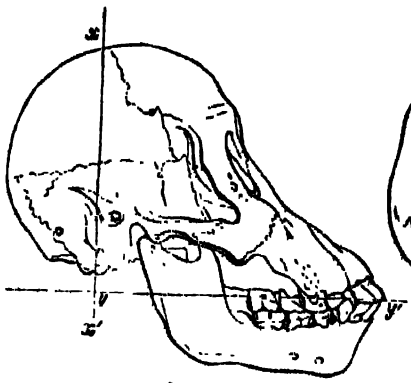


Fig. 6.—Skull of Orang-utan.

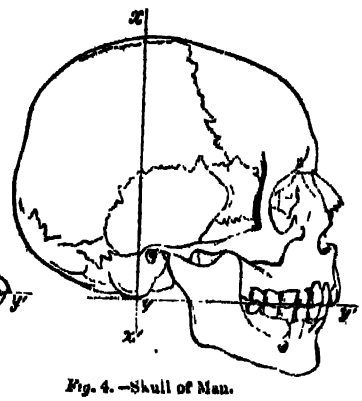


Fig. 4.—Skull of Man.

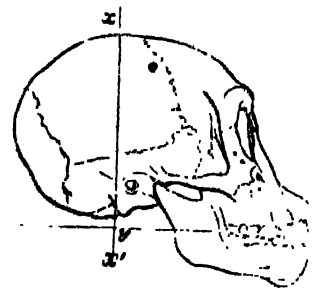


Fig. 5.—Skull of Chimpanzee

[Skulls of Man and Monkeys.]

reach the ground in standing; also that in man the spine has three natural curves, but in the other two there is but one, the consequence of which is, that the head is thrown forwards in front of the vertical line $x'x$, and the heads of both orang and chimpanzee are supported in the erect position at a mechanical disadvantage, proportional to the line $x\,y$ (*Figs.* 2 and 3). But one of the greatest peculiarities existing between man and the other two animals is in the structure of the feet. In man the entire sole of the foot is either in contact with the ground, or, owing to its arched figure, the weight of the whole body is equally distributed over it; but in the chimpanzee and orang the sole is much narrower and turns inwards, and the outer margin of the foot only presses the ground

In man the heel projects a considerable distance behind the axis of motion in the ankle-joint, and acts as a powerful lever in raising the weight of the body on the toes, whereas the bone of the heel is shorter in the chimpanzee, and shortest in the orang; also, in consequence of the inward direction of the soles of the feet in the latter animal, the muscles act on the heel with less effect than in man; added to which the muscles which raise the body on the foot are much smaller and weaker than in man. But the greatest peculiarity in the hinder extremities of the chimpanzee and orang-utan is, that the inner toe of the foot is attached in an oblique manner, so as to move, like a thumb, in a direction excentric to that of the other toes: whereby the foot in these animals answers the double purpose of a foot and a hand. In the performance of the latter function, the inversion of the sole of the foot, which obstructs plantigrade movement, tends to perfect the organ as an instrument of prehension, and adapts it for climbing trees. Thus we find these animals are endowed with four hands; and hence their generic name of *Quadrumana*. The limbs, being thus organized, may be used either as those of bipeds or of quadrupeds during progression. When the legs only are employed in locomotion on the ground, they obey many of the same laws as those of man, and the reader is referred to the account given of them in the preceding numbers on this subject for the general principles; but the mechanical structure of the chimpanzee and orang-utan renders their gait peculiar, and their power of progression on two legs is inferior to that of man. We observe amongst the higher orders of Quadrumana that in walking the long arm of the orang is frequently placed on the ground to prevent the trunk and head of these animals from falling forwards. This is chiefly owing to the single curve of the spine having its concavity anteriorly, the effect of which is to throw the shoulders and head forwards, so that the weight of these organs falls in front of the vertical line passing through the joints on which the legs move. The muscles of the legs of the Quadrumana having far less power than in man, they walk more feebly, and their bent figure gives them the attitude which is assumed during decrepit old age in the human race. If we descend further in the scale of species, we find some of the Quadrumana, such as the Cercopithecus, furnished with long tails. The tail in this order of monkeys may be considered as a fifth organ of locomotion, and is of essential service in the act of climbing The strength of the tail in some species is sufficient to enable the animal to suspend its solid weight to the limbs of trees, leaving the hands nearly free to perform many of the offices necessary in procuring food, and often to enact performances accompanied with grimaces, for which many of the monkeys are remarkable. Few of the monkeys below the orang-utan walk on the lower extremities alone, but they move on their four arms precisely like quadrupeds, as the red howling monkey in *Fig.* 7. The

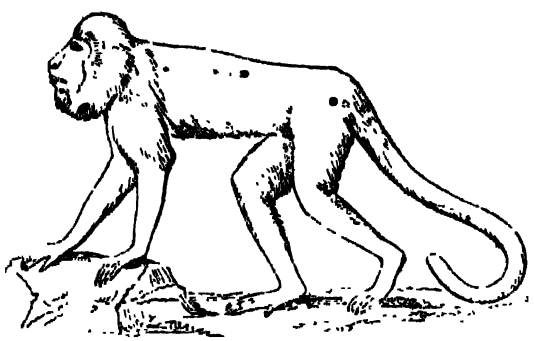


Fig. 7.—Red Howling Monkey.

lemurs, perhaps, never attempt to walk erect, and they are less capable of doing so, by their organization, than the higher orders of Quadrumana. Now, although the monkeys are denied the erect attitude and power of moving as bipeds, like man, still they move with great facility as quadrupeds, thus distributing the weight of the body on four pillars of support, instead of two; besides which, by means of their four hands, they can climb trees with a facility and precision which would cause the most agile school-boy to despair of outstripping them even for an instant. The long arms of the gibbons enable them to pass from tree to tree with wonderful rapidity, so that if they are inferior to man as bipeds, they outstrip him in moving in woods of such density that impediments present themselves at almost every step, and of such a nature as tends to obstruct the progress of the pedestrian. Indeed the conversion of the

foot into a hand in these animals, instead of being a sign of degradation, has been asserted by some foreign naturalists to be no proof of inferiority in a zoological point of view; and in support of this opinion it is said that in certain districts (as the Landes of Aquitaine) the peasants, who obtain their livelihood by collecting the resin of the pinus maritima, and who are termed *resiniers*, acquire a power of opposing the great toe to the others like a hinder thumb; but on this subject Professor Owen remarks, that "supposing the extent of the motion of the great toe to be sufficiently increased by constant habits of climbing, or in connection with a congenital defect of the upper extremities, still it does not appear that the os calcis (that is, the bone of the heel), or other bones of the foot, have lost any of the proportions which so unerringly distinguish man from the ape." Indeed, whether we turn our attention to the figure of the head, the length of the arms and legs, the structure and figure of the spine, or more especially to the conformation of the foot or hand in man, compared with those organs in the Quadrumana, we see differences which at once (at least in the eye of the zoologist) distinguish man from the highest of the lower animals; and, if these characters are prominent in the frame-work, still more conspicuous are the mental qualities which elevate and distinguish man far above all other beings inhabiting this earth.

REMINISCENCES OF TANGIER IN 1836.

[Continued from page 315]

The market is surrounded by shops or rather open stalls, just large enough to contain the seller and his goods. A description of one will serve as a specimen of the majority.

On a floor raised three feet from the ground sits, like a tailor on his board, the tawny Moorish salesman, his head covered with a red skull-cap, and his body with a coarse *jelab*. On the same floor, and ranged around him, are baskets containing rice and *couscosoo*, a white grain as small as millet,* raisins and almonds, nuts, and walnuts, dates of various kinds, with small tubs of butter (a white mess which you might take for pomatum or hog's lard on the point of melting), soft soap almost liquified by the intense heat, salt of the coarsest quality. Ducks, fowls, and pigeons are lying on the edge of the board, on either side of the bare greasy leg which is protruded from between the baskets, and is sometimes hideously swollen and ulcerated. Hanging around the dark wooden walls are bundles of large matches, crockery from Fez, rudely turned and more rudely painted, with something in the shape of Bologna sausages, but into the composition of which you may be sure no pork has entered.

Notwithstanding the variety of its contents, the shop is so small that every article is within reach of the salesman as he sits in the midst. He appears generally lost in contemplation of the pair of scales before him, but from time to time he turns over the soft soap with a wooden ladle, raising it high in the air and letting the seedy, glutinous mass descend in long fibrous flakes; or he pats and stirs up the butter, or scares away with a palm-leaf fan the myriads of flies which swarm around his goods. He evinces no desire for custom, but sits in profound silence, with true Mohammedan dignity, never seeking to attract the attention of the passers-by. If they come and buy—good; "Allah is most great!"—if not—why, good also; "it is the will of Allah!" Stop and inquire his prices—he mutters a careless reply. Express a wish to examine some article, suspended at the back of his shop, for instance;—he slowly stretches forth his hand, perhaps without turning his head, and lays it before you without a remark. There is no abating his price; if you declare an article to be dear, he calmly replaces it in silence. I never witnessed such sullenness, such apathy as in these Moorish salesmen. The Jews, on the contrary, display all the eagerness to sell that characterizes their race; and a few of the Moors whose goods are spread on the ground in the centre of the market, losing the dignity which the shelter of a stall seems to confer, catch a little of the same spirit.

Most of the shops in the market-place are similar to that just described; others are occupied by orange-merchants, butchers, venders of wicker-ware, and straw hats. Some are rich in haiks and turbooshes, silks, sashes, and gay handkerchiefs from Fez, with linen and cloths in variety; others are hung round with Moorish slippers, yellow and red, and shoes of European shape, of every colour. The yellow slippers are always worn by men, the red by women—the converse, I believe, is the fashion in Turkey,—and both sexes wear them on their bare feet in the same slip-shod manner.

Near the market is a small bazaar—a court surrounded by stalls of drapers and haberdashers. In some of the neighbouring streets are the work-shops of carpenters, who use their tools with tolerable skill—of blacksmiths and weavers of haiks, who carry on their operations much on the same principles as in Europe. But what seems to indicate the nearest approach to civilization is a café, for such there is in Tangier. Be not misled, reader, by the name. If your imagination recur to the Palais Royal, and picture a saloon, magnificently adorned with chandeliers, pier glasses, gilt columns and cornices, and smart damsel to receive the compliments of the customers, you would be disappointed on visiting the reality. Pushing aside the net-work at the entrance, and passing the cane-lattice screen just within, which conceals the interior from the vulgar gaze, you enter a small, low room, with no other furniture than a mat spread on the bare earth, and another ranged against the mud wall to the height of three or four feet for the convenience of the visitors, who may be seen squatting around, sipping their coffee with becoming gravity, and listening, it may be, to the recital of some tale by one of the party. The kitchen you may observe in one corner of the apartment—the fire in a small, square, portable, earthen stove, before which sits a half-naked man, coaxing the coffee to boil. A coffee-pot and a few cups stand on the ground, and a number of ring-shaped loaves are hanging on a peg in the wall. Such is a café in Barbary.

The shops are confined to the market-place and the streets adjoining, for in the other parts of the town nothing is to be seen but low whitewashed walls and wooden doors. These are thick and heavy, often studded with iron nails, and furnished with knockers. They open into courts shaded by fig-trees, and surrounded by the apartments of the family, all on the ground-floor, for rarely is there an upper story. The roofs are always flat terraces, whitewashed as in Cadiz, and one might with little difficulty, by means of these roofs and their connecting walls, travel from one end of the town to the other; but such a journey would on other accounts be far from safe, for the house-tops are sacred to the fair sex, and no male can ascend them without the risk of being fired at by the first Moslem who perceives him. It is difficult to gain admittance to the houses of the Moors, but those of the Jews, in every respect similar, are easily accessible.

Cleanliness and comfort are unknown in Tangier, except in the houses of the consuls, which from their situation on the highest part of the town escape some of the horrible effluvia that pervade the lower streets.

* It is the heart of the wheat, extracted by bruising.

They are built in the European, or rather Andalucian style, several stories high, with courts in the centre. In the vestibule at the entrance, on a stone bench spread with coloured matting, which also covers the wall above to the height of three or four feet, sits the Moorish porter, who is generally a soldier, and has his long musket hung overhead ready for any emergency.

I have said that the filth of Tangier is execrable. In a walk through the streets every description of animal and vegetable matter in a state of decomposition meets the eye, myriads of flies rise before you at every step, and the combination of disgusting effluvia drawn forth by an almost tropical sun is not to be conceived by one who has not experienced it. The odours of Lisbon are sweet in comparison. The filth is not to be escaped in any part of the town; many nuisances also lie without the walls, and on the beach I observed carcasses of asses and other animals impregnating the air with fetid exhalations. It is surprising that the inhabitants are so healthy in the midst of so much corruption. The dryness of the climate seems their chief preservative. But epidemics are said to prevail, and that scourge of the East, the plague, sometimes visits Tangier; the marvel is that it ever quits it.

One of the things that will most forcibly strike the stranger in a Mohammedan country is the cry of the *muedhin* from the tower or minaret of the mosque, which he ascends five times a day at the stated hours, hoists a white swallow-tailed flag, and then from each of the four corners of the tower, where his body may be seen between the battlements, with a loud and sonorous voice summons the Faithful to their devotions. This done, he lowers the flag and descends the tower.

Never does this cry sound so strange as at sunset or in the dusk of the evening when it breaks from aloft upon the deep silence and startles the stranger with its loud unearthly tones. Who that has heard this prayer-call can ever forget it? Who, whatever be his creed, has not felt his soul elevated, and his devotion quickened by the solemn sounds? Impressive as is the Sabbath-bell of England; impressive as are the vesper-bells of Spain or Italy breaking the silence of the soft twilight hour, when the glorious hues of heaven are sinking into the heart, and lighting it up with sentiments of devotion; far more solemn, far more prayer-stirring, far more sublime is the cry of the *muedhin*, "God is most great! There is no God but God! Come to prayer! Come to security! God is most great! No God but God!"

On the evening of my arrival in Tangier I had been listening to these unwonted sounds with deep emotion, when, presently, harsher cries broke on my ear, spreading on every side, till the remotest part of the town resounded with them. It was the watchword of the police, which is thus circulated at short intervals throughout the night.

I was still sitting at the window of the inn, long after sunset, when I heard the report of fire-arms in a neighbouring street, and immediately there arose a beating of drums and harsh whining tones resembling those of a small shrill bagpipe. Other reports followed, the sounds began to approach, and at last entered the street in which I was; and a long train of figures passed beneath my window. It was headed by a dozen men on foot, armed with long-barrelled guns, which they discharged from time to time in the air, staggering about the while as though mad or drunk. Next marched a number of others carrying lanterns, by whose light the whole procession was made dimly visible; then followed a mule bearing a large burden, of which in the uncertain light I could distinguish no more than a peaked top; and the musicians with their ear-distracting instruments brought up the rear. These figures being wrapt from head to foot in white haiks, and seen in the dubious light of the lanterns, looked unearthly enough; and with the flashing and report of their muskets, the diabolical music, the yells, and mad, frenzied gestures, they seemed to be representing a dance of demons. It was the usual procession of a Moorish marriage; the bridegroom was walking in the midst of the lantern-bearers, and the peaked mass upon the mule's back was a wicker cage containing the bride, who, amid sounds ominous of connubial discord, was being conveyed to the abode of her husband. It was long, however, before she reached it, for the procession seemed to perambulate the whole town, as the screeching of the instruments grated on my ear for the next hour or two, and, with the oft-repeated shouts of the police, proved as good an anti-soporific as the

"—— mali culices, ranæque palustres"

which had so often broken my rest within the precincts of the Alhambra.

The Alcazaba, or fortress which crowns the height to the north of Tangier, completely bounds the town on that side, its walls stretching down the slope to the water's edge. It adds to the picturesque appearance of the place, rather than to its real strength, for its fortifications, as far as I could learn, are much neglected, and though they might resist well enough the culverins and demi-cannon of the olden time, would prove of little avail against the mortars and heavy ordnance of modern days. Owing to Moorish jealousy and distrust of Europeans, the traveller is not allowed to examine the state of the defences; but under the guidance of a soldier, who is responsible for the good behaviour of his charge, is permitted to visit the ancient palace within the walls of the fortress.

A steep and winding pathway leads from the town up to the walls of the Alcazaba. Before entering the horseshoe gateway, I turned to enjoy the magnificent scene. At my feet lay the town, enclosed within long lines of wall, and, with its low, flat-roofed buildings, resembling anything but human habitations, their dazzling whiteness contrasting with the dark foliage in the courts, it bore the appearance of a vast grave yard—a city of tombs—the tower of the mosque rising in the midst. At the foot of the bare slope on which I stood, were a few wretched thatched hovels amid a thick grove of gigantic reeds—the *Arundo Donax*; to the right, without the walls, were seen sunny hills patched with orchards and gardens, and sprinkled with white buildings; to the left lay the bay, whose broad expanse of glittering blue was unbroken save by the two French ships at anchor in the distance. Passing over the wavy semicircle of glowing sand-hills which bounds the bay, the eye rested on the mighty chain of the Atlas, looming in the south-eastern horizon, and sought relief in its cool grey masses, and snow-capt peaks, from the dazzling brilliancy of nearer objects.

The palace of the Basha, or Governor of Tangier, is just within the gateway. I heard it was not difficult to obtain an introduction to his excellency, but not deeming it worth the present expected on such occasions, I contented myself with a view of the singular vestibule, full of columns, which fronts his residence. Adjoining, is the ancient palace of the Emperors of Morocco, now in ruins, and presenting little more to the curiosity of the traveller than a large square court surrounded by a horseshoe arcade, and bounded on two sides by narrow chambers, rich in colour, gilding, and arabesque tracery. Though this ruin may interest those who have not seen the Saracenic palaces of Spain, it can bear no comparison with the glories of Seville and Granada.

I left the castle by a gateway in its western wall. On the crumbling ramparts were several storks' nests,

composed of boughs and twigs, from which the young ones were stretching up their long bills to their parents, who stood over them arranging their grey and white plumage, quite unalarmed by our proximity: they acquire this confidence in man through the respect paid them by the Moors, who view them as sacred and never molest them; or rather, do they not ensure respect by the confidence they first repose in man? They seem to carry about with them everywhere a passport for respectful treatment, which is attended to by the enlightened Prussian and Dutchman, as well as by the superstitious Turk, Moor, and Arab. These birds do not remain at Tangier throughout the year, but arrive in the beginning of May, and migrate southward in the autumn to seek a warmer climate than this coast, which is far colder in winter than the opposite shores of Europe.

Descending the slope from the castle, with the town-walls on the left, and thick groves on the other hand, we reached the western gate of Tangier. On the slope of the hill just above is the garden of the Swedish consul, a pretty spot planted with fruit-trees and shrubs peculiar to the climate; and high above all a fine specimen of the dragon's-blood tree, the famed palm of Teneriffe, rears its spreading crest of fans. An elevated terrace in this garden commands a beautiful view over the town, with its long circuit of turreted wall, its white house-tops within mingling with the fig-trees; the towers of the mosques and the noble houses of the consuls bristling with flagstaffs, and standing out in bright relief from the deep blue of the bay, which contrasts in its turn with the line of hot sandy coast beyond, terminating in the low tower-capped headland of Malabat. To the left the view is bounded by the Alcazaba, which, with its long lines of battlemented wall and the mosque-towers within, frowns proudly upon the town at its feet; while stretching from behind it far into the middle of the scene, and bounding the broad lake-like Straits, are the distant mountains of Andalucia, waving away eastward towards Gibraltar. The rock itself, being only thirty miles distant, is visible in this clear atmosphere, except during an easterly wind, which always shrouds it in a mist. Such was now the case; but the deep blue horizon of the Mediterranean was clearly defined against the azure sky, and the expanse beneath me was studded with vessels, all hastening to exchange the sunny waters of the inland sea for the wide waste of the Atlantic.

Adjoining this garden is the Christian burial-ground, where natives of every country in Europe are united in death,—the distinctions of nation and creed dissolved, they sleep side by side in a common sepulchre.

The cemetery of the Moors is on the hill above the garden of the Swedish consul: it has no enclosure, and the tombs, which are but slightly raised and have a small wooden tablet at one end, lie mingled with an underwood of dwarf fan-palms. On the same hill, more to the south, is the sepulchre of a Moslem saint, the patron saint of Tangier, marked by a little white flag streaming from a staff above it. Externally it resembles a small house, but my guide would not allow me to approach it for fear of insult. Still farther on the same ridge are the house and grounds of the Dutch consul, which command a magnificent view of the town and Straits.

[To be continued.]

The Trumpet-Beetle of Penang.—There is one curiosity in natural history very common on this island, which I had never seen elsewhere, namely, the trumpet-beetle. Although not large in itself, it has a long trumpet-shaped proboscis, or kind of feeler, from which it emits so loud and long a sound, among the woods by the mountains' sides, that you can scarcely believe that any insect could possibly send forth such a tone. It gave one more the idea of the sound which a bird might utter, such, for instance, as that of the bell-bird, or the whip-bird, or the laughing jackass (vernacularly called) met with in New South Wales. —*Voyages of the Nemesis.*

A Battle between two Hares.—On Easter Sunday, in the afternoon, as I was proceeding with my brother-in-law, Mr. Carr, to look at a wild-duck's nest in an adjacent wood, we saw two hares fighting with inconceivable fury on the open ground, about a hundred and fifty yards distant from us. They stood on their hinder legs like two bull-dogs resolutely bent on destruction. Having watched them for about a quarter of an hour, we then entered the wood,—I observing to Mr. Carr that we should find them engaged on our return. We stayed in the wood some ten minutes, and on leaving it we saw the hares still in desperate battle. They had moved along the hill side, and the grass was strongly marked with their down for a space of twenty yards. At last one of the sylvan warriors fell on its side, and never got upon its legs again. Its antagonist then retreated for a yard or so, stood still for a minute as if in contemplation, and then rushed vengefully on the fallen foe. This retreat and advance was performed many times; the conqueror striking its prostrate adversary with its fore feet, and clearing off great quantities of down with them. In the meantime the vanquished hare rolled over and over again, but could not recover the use of its legs, although it made several attempts to do so. Its movements put you in mind of a drunken man trying to get up from the floor after a hard night in the alehouse. It now lay still on the ground effectually subdued, while the other continued its attacks upon it with the fury of a little demon. Seeing that the fight was over, we approached the scene of action—the conqueror hare retiring as we drew near. I took up the fallen combatant just as it was breathing its last. Both its sides had been completely bared of fur, and large patches of down had been torn from its back and belly. It was a well-conditioned buck-hare, weighing, I should suppose, from seven to eight pounds.—*Waterton's Essays on Natural History.*

The Sleeping Fish of the River Gambia.—Specimens of this very interesting animal, "the Lepidosiren annectans" of Professor Owen, have been sent to England by James Warren Hunter, Esq., and are now in the museum of the Bristol Institution. They were accompanied by the following description:—"This extraordinary fish sleeps nine months out of the twelve. It propagates in August and September, feeds principally on vegetables until the middle or end of November, then, according as the rains are early or late, while the ground is soft, it makes a hole about a foot below the surface, into which it enters; it then doubles itself up, and in this position remains, with the double part down and the head and tail towards the surface, preserving two small holes upwards through the ground to admit air. Nature forms a skin or soft shell between the fish and the earth; this skin is very complete, and between the fish and the skin there is a glutinous liquor that keeps the fish moist all the time of its confinement, and there it continues until the middle of July, when the ground that it inhabits is again inundated and it then bursts from its imprisonment." On the 25th instant a box arrived at the Institution, containing two large lumps of indurated mud, as hard as bricks, containing two of these animals, presented by the gentleman before named. On making a section of one of these masses for the purpose of exhibiting the animal in its reposing-place, we were much surprised to find it still alive, but apparently torpid; it was enveloped in a pelicle or skin as before described, which not only invested the whole animal, but entered the mouth, terminating in the mucous membrane, thus leaving apertures for respiration, which at this time is small and distant. It was then placed in tepid water (80° Fahr.), and after a short time a strong expiration of air took place, and water was observed to pass through the gill-covers. In about fifteen minutes, and by means of some violent struggling, it released itself from its earthly tomb and became a free amphibious animal, after a sojourn in a cavity scarcely larger than itself, and baked by the heat of a tropical sun nearly as hard as stone, for more than nine months.



"Meanwhile th' approach'd the place where Bruin
Was now engag'd to mortal ruin."

HUDIBRAS.—No. VI.

The third Canto of the first Part contains the continuance and final result of the 'adventure of the Bear and Fiddle,' and this result is indicated in the introduction to the Canto, which, though expressed with such playful familiarity as to force us to smile, contains a philosophy verified by the experience of ages:—

"Ah me! what perils do environ
The man that meddles with cold iron!
What plagny mischiefs and mishaps
Do dog him still with after-claps!
For tho' dame Fortune seem to smile,
And leer upon him for a while,
She'll after show him, in the nick
Of all his glories, a dog-trick."

The rabble had recovered from their fright, and their first thoughts were given to the recovery of their Bear, and to revenge themselves on the cause of its loss. The poor flying animal had been pursued by the dogs, until

"Attack'd by th' enemy i' the rear,
Finding their number grew too great
For him to make a safe retreat,
Like a bold chieftain fac'd about;
But wisely doubting to hold out,
Gave way to fortune, and with haste
Fac'd the proud foe, and fled, and fac'd;
Retiring still, until he found
H' had got th' advantage of the ground;
And then as valiantly made head
To check the foe, and forthwith fled;
Leaving no art untry'd, nor trick
Of warrior stout and politick;
Until, in spite of hot pursuit,
He gain'd a pass, to hold dispute
On better terms, and stop the course
Of the proud foe. With all his force
He bravely charg'd, and for a while
Forc'd their whole body to recoil;
But still their numbers so increas'd
He found himself at length oppress'd,
And all evasions so uncertain,
To save himself for better fortune;

That he resolv'd, rather than yield,
To die with honour in the field,
And sell his hide and carcase at
A price as high and desperate
As e'er he could. This resolution
He forthwith put in execution,
And bravely threw himself among
The enemy, i' th' greatest throng.
But what could single valour do,
Against so numerous a foe?
Yet much he did, indeed too much
To be believ'd, where th' odds were such;
But one, against a multitude,
Is more than mortal can make good;
For while one party he oppos'd
His rear was suddenly inclos'd;
And no room left him for retreat
Or fight against a foe so great;
For now the mastives, charging home,
To blows and handy-gripe were come:
While manfully himself he bore,
And setting his right-foot before,
He rais'd himself to show how tall
His person was above them all.
This equal shame and envy stirr'd
I' th' enemy, that one should beard
So many warriors, and so stout,
As he had done, and stay'd it out,
Disdaining to lay down his arms,
And yield on honourable terms.
Enraged thus, some in the rear
Attack'd him, and some ev'ry where,
Till down he fell; yet falling fought,
And, being down, still laid about:
As Widdrington in doleful dumps,
Is said to fight upon his stumps."

Trulla and Cerdon were the first who arrived to his rescue;

"And joining forces, laid about
So fiercely, that th' amazed rout
Turn'd tail again, and straight begun
As if the Devil drove, to run.
Meanwhile th' approach'd th' place where Bruin
Was now engag'd to mortal ruin:
The conquering foe they soon assail'd,
First Trulla stav'd, and Cerdon tail'd,
Until the mastives loos'd their hold."

The foes of the bear being repelled, the

"gentle Trulla, into th' ring
He wore in 's nose, convey'd a string,
With which she march'd before, and led
The warrior to a grassy bed,
As authors write, in a cool shade,
Which eglantine and roses made;
Close by a softly murmuring stream,
Where lovers us'd to loll and dream:
There leaving him to his repose,
Secured from pursuit of foes,
And wanting nothing but a song,
And a well-tun'd theorbo hung
Upon a bough, to ease the pain
His tugg'd ears suffer'd; with a strain
They both drew up, to march in quest
Of his great leader, and the rest."

From the Elizabeth era to Butler's own time there had been a fashion, imitated from the ancients, among whom Ovid may be quoted, of writing verses wherein Echo is made to give the answer. Shakspere, in his 'Venus and Adonis,' affords an advantageous specimen of its use:—

"She says, 'tis so;' they [the echoes] answer all 'tis so;'
And would say after her, if she said 'no.'"

But other authors carried it to a ridiculous excess, and in the lament of Orsin for his bear, Butler ridicules the abuse by the most laughable exaggeration. He has been the progenitor, probably of the Irish echo, which, to the question "How d'ye do, Paddy Blake?" echoed "Pretty well, thank ye:"

"He beat his breast, and tore his hair,
For loss of his dear crony Bear:
That Echo, from the hollow ground,
His doleful wailings did resound
More wistfully, by many times,
Than in small poets' splay-foot rhimes,
That make her, in their rueful stories,
To answer to int'rogatories,
And most unconscionably depose
Things of which she nothing knows:
And when she has said all she can say,
'Tis wrested to the lover's fancy.
Quoth he, O whither, wicked Bruin,
Art thou fled to my—Echo, Ruin?
I thought th' hadst scorn'd to budge a step
For fear—(quoth Echo) Marry geep.
Am not I here to take thy part?
Then what has quail'd thy stubborn heart?
Have these bones rattled, and this head
So often in thy quarrel bled?
Nor did I ever wince or grudge it,
For thy dear sake. (Quoth she) Mum budget.
Think'st thou 'twill not be laid i' th' dish
Thou turn'dst thy back? Quoth Echo, Pish.
To run from those th' hadst overcome
Thus cowardly? Quoth Echo, Mum.
But what a vengeance makes thee fly
From me too, as thine enemy?
Or if thou hast no thought of me,
Nor what I have endur'd for thee,
Yet shame and honour might prevail
To keep thee thus from turning tail:
For who would grutch to spend his blood in
His honour's cause? Quoth she, A pudding."

Orsin at length meets with his companions, and the whole resolve, in order to revenge their discomfiture, to go in search of Hudibras and Ralpho, and to punish them for their interference. In the meantime the hero had retired

"Unto a neighbouring castle by,
To rest his body, and apply
Fit med'cines to each glorious bruise
He got in fight, reds, blacks, and blues;"

which being done, he takes a sudden resolve, inspirited by his recent success, to visit his mistress; for

"he 'd got a hurt
O' the inside, of a deadlier sort,
By Cupid made, who took his stand
Upon a widow's jointure land."

This widow, who occupies a prominent place in the remainder of the poem, is described with great humour:—

"She had a thousand jadish tricks,
Worse than a mule that flings and kicks;
'Mong which one cross-grain'd freak she had,
As insolent as strange and mad;
She could love none but only such
As scorn'd and hated her as much."

The Knight had resolved in despair to abandon the pursuit, but now, as he remarks to himself,

"who knows
But this brave conquest o'er my foes
May reach her heart, and make that stoop,
As I but now have forc'd the troop?
If nothing can oppugn love,
And virtue envious ways can prove,
What may not he confide to do
That brings both love and virtue too?
But thou bring'st valour too and wit,
Two things that seldom fail to hit.
Valour 's a mouse-trap, wit a gin,
Which women oft are taken in.

Then, Hudibras, why should'st thou fear
To be, that art, a conqueror?
Fortune th' audacious doth *favore*,
But lets the timidous miscarry.
Then while the honour thou has got
Is spick and span new, piping hot,
Strike her up bravely thou hadst best,
And trust thy fortune with the rest."

On quitting the postern-door to make the purposed visit, the Knight and Squire discover their foes approaching to attack them. The combat commences, and after some minor incidents, one of which is the fortunate effect of the accidental discharge of his pistol, the Knight engages in a fierce conflict with Cerdon and Orsin:—

" Courageously he fac'd about,
And drew his other pistol out;
And now had half-way bent the cock,
When Cerdon gave so fierce a shock,
With sturdy truncheon, thwart his arm,
That down it fell, and did no harm:
Then stoutly pressing on with speed,
Assay'd to pull him off his steed.
The knight his sword had only left,
With which he Cerdon's head had cleft,
Or at the least cropp'd off a limb,
But Orsin came, and rescu'd him.
He with his lance attack'd the knight
Upon his quarters opposite.
But as a bark, that in foul weather,
Toss'd by two adverse winds together,
Is bruis'd and beaten to and fro,
And knows not which to turn him to:
So far'd the knight between two foes,
And knew not which of them t' oppose;
Till Orsin, charging with his lance
At Hudibras, by spiteful chance
Hit Cerdon such a bang, as stunn'd
And laid him flat upon the ground.
At this the knight began to cheer up,
And raising up himself on stirrup,
Cry'd out, Victoria: lie thou there,
And I shall straight dispatch another,
To bear thee company in death."

And here we shall leave the Knight in his first success for the present, with the following representation of his short-lived triumph.



[Combat of Hudibras with Orsin and Cerdon.]

The Water-carrying Girls of Venice.—Another description of persons of the same class in life as the gondoliers are very conspicuous and picturesque in Venice, the water-women, none of whom are natives of the place. A Venetian woman would not be so unmindful of her dignity as to carry about pails of water from the Pozzi, or wells, which are locked and let out on hire. From the mountains in the neighbourhood of Cenida and Longerone, bordering on the Tyrol, young, blythe-looking, active girls come to Venice for the like purpose that "Jamie went to sea, to make his crown a pound." They enter on the arduous business of carrying fresh water from the reservoirs, which occupation they commence at an early hour of the day; there never is a chance of mistaking them for any of the ordinary inhabitants, for besides the striking elasticity of their movements and animated air, they wear a uniform dress, short gown, and petticoats of bright colour, a round hat (such as our Welsh peasantry exhibit) put on in a peculiarly smart way over plaits of hair which protrude luxuriantly beneath it at the back of the head. In winter the hats are beaver, and in summer straw, and in every season always decorated with a bunch of flowers. These comely girls never settle here; they are remarkably well conducted, and sure as the carrier-pigeon makes for its destination, each one returns to her mountain home, and to the lover for whose sake she has wandered thence, as soon as a sufficient competence for married life has been acquired. We are told that no instance has occurred of any one of them remaining permanently in Venice, unless arrested by the cold hand of death; and they invariably go back uncontaminated by the habits of a city where, it has been said, that

" Cupids ride the lion of the deeps;

they escape hence when their object is attained, as a bird from a cage, who joyfully regains freedom, and soars into a congenial world far from its prison abode, only endured and never loved. —*Mrs. Ashton Yates's Winter in Italy.*



[Amberly Castle.]

RAMBLES FROM RAILWAYS.

The Adur, Arun, and Wey.—No. IV.

Arundel, as you look up to it from the river, is one of the most beautiful towns we know. It is situated on the irregular slope of a high hill, on whose summit stands the noble castle, half hidden among lofty trees; the river meanders along its base, reflecting in its translucent waters an inverted image of the town and castle; while on either hand stretch "bosky acres and unshrubbed downs." As you follow the windings of the river from Tortington, it is seen to great advantage; every fresh curve gives you a new and always picturesque view of it. There is a lane, too, leading from Tortington to Arundel between whose hedgerow elms you obtain some pleasant glimpses of the old town. The rambler will do well to make Arundel his head-quarters in a Sussex trip. The neighbourhood all around is beautiful, and he will find no lack of pleasant walks, either in the immediate vicinity of the town or at a short distance from it. Arundel is an ancient town, and there are some old houses about it, but not many, and they are not very carefully preserved. The church has some details worth inspection, but it has been renovated and somewhat modernized. It contains some rather remarkable monuments to the Earls of Arundel, which will interest the student of our ancient costume. One in particular, to a Countess of Arundel, has attracted much attention on account of its curious head-dress. Charles Stothard, in his beautiful work on 'Monumental Effigies,' has given etchings of some of these monuments. The castle is admirably situated on an eminence overlooking the town, and commanding wide and beautiful prospects. The park, too, is large, abounding in trees, and well stocked with deer and game. It is greatly varied in surface, full of pleasant dells and glades, and altogether its scenery is of a somewhat unusually romantic character. The history of the castle is too long for us to relate here: we can only mention two or three of the more prominent circumstances. Alfred the Great bequeathed the town of Arundel, together with the castle, to his nephew Adhelm. In the reign of Stephen, the castle was held by Queen Adeliza, relict of Henry I. When Queen Maud contested with Stephen for the crown of England, she landed at Little Hampton, and was received into Arundel Castle and hospitably entertained by Adeliza, who does not, however, appear to have taken part with her. She had been but a short time in the castle, when Stephen suddenly appeared with a strong force before it, and demanded that she should be given up to him. This Adeliza resolutely refused, pleading the rites of hospitality and kindred, and Stephen generously permitted Maud to depart unmolested. At the commencement of the war between Charles I. and the parliament, Arundel Castle was held by the parliamentary forces, but gained by an unexpected assault by Lord Hopton for the king. He did not, however, retain it long: in less than two months it was retaken by Sir William Waller. The famous Chillingworth was in the castle when it was attacked by Waller, and his death is said to have been caused by the excitement and fatigue of the siege, and the ill-treatment he received when he fell into the hands of the parliament soldiers. Some say that he was actively engaged during the siege in constructing machines after the Roman method, and the vexation arising from their failure greatly hastened his death. He was a good logician, and used his logic to some purpose in theology; but he left out an important consideration in his military elenchus, when he forgot that the Romans did not employ "villainous saltpetre" in their sieges. Colonel Gunter, in his 'Narrative of the Escape of Charles II.,' relates that Charles passed through Arundel while it was held by the parliamentary troops. Charles had slept at the house of the Colonel's sister at Hambledon, "and by breake of day," says the Colonel, "putting up two neats' tongues in my pocketts, which I thought we might need by the way, we sett out, and began our journey. We were no sooner come down to Arundell Hill, as we rode close by the castle, but the governor, Captaine Morley, mett us full butt, hunting. The Coll., the better to avoid them, presently alighted—it being a steep hill we were to go downe—and his company (as was agreed before) did as he did. And so happily we escaped them. The king being told who it was, replyed merrily, 'I did not like his starched mouchates.' So we came to Howton, where, on horseback, we made a stopp at an alehouse for

some bread and drinke; and there our neats' tongues stood in very good stead, and were heartily eaten."

Arundel Castle was afterwards reduced to ruins; almost the only portion of the old castle that remains is the large round keep that forms so striking a feature from the neighbouring country. Dallaway, in his 'Rape of Arundel,' says it is Saxon, all Norman keeps being square. It is, or was not long since, used as a preserve for some remarkably large and fine owls, of some foreign kind, but we forget what. The present castle, which is a grand building, though not such as it ought to be, was erected by the late Duke of Norfolk. It is large, and contains some handsome rooms. One is especially pointed out to notice; it is called the Baron's Hall, and is seventy feet long by thirty-four feet wide, with an open roof carefully constructed from those at Westminster, Eltham, and Crosby halls; the windows are of stained glass, and altogether the room is a very handsome one. There are a good many antiquarian nicknackeries about the castle, for the late duke was a collector of such things—it is said he offered a hundred guineas for the "great bed at Ware," but we know not whether it be true; there are also some good pictures, and it may be profitably examined. Dallaway, in the work before referred to, gives the history of the Howard family in connection with the castle at fearful length; and Tierney, in his 'History of Arundel,' repeats it with little more brevity. There is a good deal of interest in it, no doubt, but he must have more patience than we possess who can wade through it—when not, like us, unfortunately obliged to do so.



[Mill at Arundel.]

Just under the castle, on an arm of the Arun, is a picturesque water-mill called Swanbourne Mill. It stands on the site of an ancient feudal mill; and it appears so old that it is not impossible but some part of it may be a relic of feudal times. At any rate, a mill here is particularly described in Domesday, and in almost every subsequent record of the baronial appendages. All the tenants in the barony were compelled to grind their corn here. In 1279, when one John de Polingfold erected a windmill at Lyminster, nearly two miles distant, the Earl of Arundel directed him to remove it; but he refused, and a jury was in consequence assembled, who ordered it to be demolished, and amerced De Polingfold in a considerable fine for having thus trenched on the rights of his lord. In 1380 the yearly rent of Swanbourne Mill was 25*l.*, which is a sufficient evidence of its importance. Richard, Earl of Arundel, gave the tithes of it to his newly founded college, and these, at the dissolution, were valued at 6*l.* per annum. It should by all means be visited: a mill more picturesque in itself or in its situation is not likely to be soon met with. Close under a high chalk scarp, that is almost concealed by luxuriant trees, and crowned by the ivy-coloured keep, the old mill snugly nestles. As you gaze on its tall roofs and projecting gables—its strongly contrasted lights and shadows, and rich warm colouring, and watch the frothy sparkling water starting in light crisp foam from the huge wheel, and, after whirling awhile in widening eddies, settling into the intensely brown shadow, and that again melting imperceptibly into transparency ere it reaches your feet—you long for the cunning hand of old Hobbima, or that Hobbima had had such a mill to paint. From this spot you can only see a portion of the castle; a little farther up the river the whole may be seen, at least of the turrets, and it has a noble appearance stretching for so great a space along the ridge of the hill. The view you there obtain of the castle and a corner of the town is quite a contrast, and a lovely one, to that view of Arundel to which we called attention as we approached the town from Tortington. From this place Arundel is scarcely seen, and the keep is the most prominent feature of the castle: all about is still, gentle, undisturbed; at the close of the evening the visitor will feel its quiet, sombre character, and as the landscape becomes lost in the gloom, and lights begin to appear at one and another of the castle windows, and perhaps are seen hurrying from one part of the dark building to another, his thoughts will revert to feudal times, and his fancy yield a momentary belief that some rude but gaudy pageant is even now in preparation.

The river here abounds with fish; it has long been famous for its eels and its mullets, the latter of which are very delicious and much prized. Fuller mentions them in his 'Sussex Worthies;' he says, "this county is eminent both for sea and river fish, namely, an Arundel mullet, a Chichester lobster, a Selsey cockle, and an Amberley trout." The scenery along the course of the river for the next few miles is almost all that the pedestrian can desire, calm, gently varying, nowhere grand, but uncommonly beautiful. This part of the Arun has ever been a favourite resort of the painters: and no wonder. The way under Arundel hill is of course less tortuous than beside the river, and hardly less beautiful—indeed we are not sure that it does not afford more striking views. It is not our purpose, as we said, to describe the scenery, except by a few general touches; and there is no place we need stop at hereabout. Barpham, which stands on the right of the Arun, not far from Arundel, will attract attention; its church, which is on an elevation, being a prominent object from the river, and, with the little village, rather picturesque. Here, and in the neighbouring parish of North Stoke, are traces of a large military camp. Passing by North and South Stokes, we reach Houghton, where the Arun is crossed by a substantial bridge; Houghton itself is a pretty village. About half a mile farther is Amberly, a thoroughly secluded village, but one that should be visited by all who are in its neighbourhood. It contains some considerable portions of an old episcopal castle, which stands close by the church. It is built on a sandstone rock, and forms a parallelogram; the exterior wall on the north side is entire, as are also the east and west ends. Our view is of the south side, which is not so perfect, but more noticeable as containing the principal entrance, which is between two small round towers, with grooves for a portcullis. This side is defended by a fosse, which is crossed by a bridge to the main entrance.

The castle does not appear to have been of much strength; but there are some arches and cloisters in the interior, which show that the architecture was in an elegant style. In one of the apartments, called the Queen's room, it is said, "are the remains of the portraits of ten ancient monarchs and their queens, with their coats properly blazoned; and on the ceilings are the portraits of six warriors carved in wood." We regret that we did not visit this room when at Amberly a few weeks since, so that we cannot say whether these portraits exist now. This castle was erected in 1368, by William Rede, bishop of Chichester, as a residence for himself and his successors; but it was afterwards leased to various parties, till it finally passed into the possession of Lord Selsea. When the parliamentary soldiers held possession of Arundel Castle, a party of them, under Waller, plundered and dismantled Amberly Castle. A small portion of the old edifice is converted into the residence of a farmer.

Wherever there is the ruin of an ecclesiastical edifice, the neighbouring church is almost always worth looking at; and Amberly is not an exception. The nave of Amberly church is Norman, the chancel of the early English style; and there is a Norman arch between the nave and chancel richly carved. In the chancel is an enamelled sepulchral plate, in memory of John Wantly, who died in 1424; he is represented in a curious surcoat or tabard, on which his arms are worked. It is figured in Stothard's 'Monumental Effigies.' In situation Amberly is highly picturesque; the village runs along the rock, on the ridge of which the church and castle are constructed, and though rather a poor place in itself, will catch the attention of one observant of such objects. Fuller, as we have seen, speaks of "an Amerley trout" as one of the famous things of Sussex; but Dallaway will have it they are not trout at all, but salmon, which are still taken in the Arun here, though not in plenty; nor, according to him, are they very fine. Amberly is now somewhat celebrated for its cranberries; a great deal of peat is also procured here. Parham Hill, not far from Amberly, commands an extensive prospect in every direction; in clear weather the Isle of Wight is distinctly seen. From Amberly and Parham there is a way along the top of the downs (the road runs somewhat lower) to Steyning, that can hardly be surpassed for wide and various prospects throughout the South-down district. We have often, and always with new delight, gone along this ridge, passing by the Devil's Dyke to Lewes. But now we must descend to our river, and at Amberly we quit the South downs.

REMINISCENCES OF TANGIER IN 1836.

[Concluded from page 328.]

In his wanderings through the environs of Tangier, the traveller can hardly fail to experience disappointment. He has come to Barbary, the land of dates, naturally expecting to see those beautiful trees rearing their feathery crests in every grove, and almost over every house; yet not one solitary date-palm will he behold within or near the town of Tangier. He is told that they grow only far in the interior. The fruit exported is brought from Tafilelt, a month's journey inland, where there are said to be no less than sixty distinct species of the date.

In other respects the vegetation seemed to me in no way to differ from that of the coast of Andalucia; dwarf fan-palms, the *chamærops humilis*, huge aloes, and prickly-pears growing by the way-side, give it the same tropical character; while the orange, citron, fig, and pomegranate-trees seem to want but a less arid and sandy soil to flourish with equal luxuriance. On other parts of the coast, especially about Tetuan, the orange-groves are said to constitute a terrestrial paradise, more intoxicating to the senses than the far-famed *huertas* of Seville and Murcia.

The *cooscoosoo*, of which the Moors are so fond, seems the prototype of the Spanish *olla*. It is served up in a large dish with roasted fowls and eggs boiled hard, and would be very agreeable, were it not for a peculiar sweetness in the flour of which it is composed. The bread of Tangier is porous and good, though inferior to the close-grained biscuity bread of Spain. The butter is not salted, and by no means bad, in spite of its lard-like appearance, but I could never relish it, nor anything but fruit; for the remembrance of the greasy, disgusting limbs of the merchants stretched amongst their goods, the swarms of flies, the filth of the shops, and the rancid soft-soap mixed with the eatables, gave me a distaste for every meal.

The Moors are the most ignorant and superstitious of all the tribes that profess the creed of the Prophet: the literature of their own country is almost unstudied and unknown by them. Art and science are here but in their dawn, or, I should rather say, in the last stage of decay; for this people, after having received, three or four centuries since, large infusions of intelligence and civilization from the most highly polished race of Mohammedans that ever existed—the Moresco Spaniards—seem now to be taking but the first step from the savage to the civilized state of society—seem now for the first time to have covered their nakedness with rude garments—for the first time to have erected huts and congregated within walls.

Their antipathy to Christians is so great, that were an European to attempt to penetrate the country unattended by a Moorish soldier, he would infallibly be murdered or enslaved by the peasantry. Gibraltar and the neighbouring towns are rife with fearful stories of Christians landing on the Barbary shore for sport, or cast there by tempests, and being never heard of more. In Tangier, however, on account of its frequent intercourse with Gibraltar, and of its being the residence of the foreign consuls, Christians meet with much less insult than in Tetuan and other towns on the coast. But the ignorance and prejudices of the people occasion considerable annoyance to the traveller. He cannot, in many instances, satisfy his curiosity without great danger. He cannot even ascend to the flat roof of his abode without incurring the risk of being fired at. It is scarcely safe to carry a book in one's hand through the streets, and my guide always warned me to conceal my portfolio. Whether they imagined it capable of exerting some malign influence over them, or thought it was intended to receive a plan of the fortifications, I could not learn. The difficulty of sketching I found to be a general complaint among travellers, who, amid scenes of so novel a character, are naturally anxious to carry away some memorials more fixed and substantial than those of the brain. To attempt it within the walls would be most dangerous; even outside the town I could only accomplish it by stealth. While engaged in sketching some camels, I was disturbed by loud outcries from a party of Moors who sat without the gates, and my guide explained it by saying they threatened to fire on me unless I instantly desisted. If, as my guide asserted, they concluded I was drawing a plan of the fortifications, it was a proof of their ignorance as well as jealousy, for I was standing at the time with my back to the walls.

This hatred and jealousy of Christians seems stronger among the young than among adults. You cannot walk through the streets without provoking abuse from the children. I stopped one day at the door of a school-room, in which twenty or thirty urchins were

squatting on the bare earth scribbling on large slates; the long *queues* depending from their shaven heads gave them, as they sat with their backs towards the door, a very singular appearance. As soon as they espied me, there arose a general murmur of displeasure, and abusive epithets broke from every mouth. The master, who sat in the farther corner, after in vain laying about him with a long cane, civilly begged me to walk on, as his boys would never be quiet in the presence of a Christian. On another occasion, I observed some filthy brats entering a bakery, carrying trays covered with pats of dough. I looked in, but no sooner did the little rascals perceive me, than they began to abuse me violently, at the same time wetting their fingers and marking their breasts, in order to avert the influence of the "evil eye" upon the food.

The Jews of Tangier seem to form almost one-half of the population. They are numerous enough throughout the empire, but swarm particularly along the coast, attracted by the facilities of trading with Gibraltar. In Tetuan, and other cities of Morocco, a particular quarter is set apart for their residence, and within it they are confined during the night, as in the Ghetto of Rome, but in Tangier their houses are mingled indiscriminately with those of the Moors. The Jew in Barbary wears the dress prescribed by law; he is forbidden to assume the Mohammedan costume, with the exception of the *jelab*, but the hood of this he is not allowed to raise; and were he to put on the haik, crimson turboosh, yellow slippers, or any of the prohibited articles of dress, he would in all probability be slain by the first Moslem he encountered. Christians are not under the same restrictions, and can assume the Mohammedan costume at pleasure.

The Jewesses of Barbary are famed for their beauty. Their features are good, frequently with nothing of a Jewish cast, and with an openness of expression rarely possessed by their sisters of England. Eyes very full and dark, with long jetty fringes, and a soft swimming expression, with complexions more pure and delicate than Spanish women can boast, enhance their other charms. Their head-dress is very peculiar; a red scarf is bound over the forehead, and hangs far down the back, its ends adorned with a golden fringe; over this is a small crimson cap; and above all a white handkerchief passing beneath the chin, tied behind the head, and falling over the scarf behind. They wear a close jacket, and a caftan of green or crimson.

The married females walk abroad freely and unveiled. When at home, they are generally to be seen sitting on a cushion in the Oriental style, nursing their children, or, if of low rank, engaged in sifting flour or in some other domestic duty. An old Jew, who prided himself on possessing a very handsome young wife, took me to see her. I found her in a small narrow apartment, squatting on the floor, with an infant in her lap, whose face was covered with red spots, as though it had the small-pox; but these, she told me, were only the bites of fleas and musquitoes. An elder child lay slumbering on a bed, its face literally black with the swarms of flies clustering on its features, especially in the hollows of the eyes. The mother of these two children was scarcely fifteen!

Jews and Christians of every sect are allowed in Barbary to follow the observances of their various religions undisturbed, and even to erect places of worship. The Christians at Tangier are not numerous enough to build a church, Catholic or Protestant, and service is therefore performed in the houses of the consuls, who congregate according to their creeds. Since the Mohammedans are too tolerant to interfere with the religious faith of their neighbours, it ought to be no matter of reproach that they do not allow their own peculiar rites and ceremonies to be submitted to the gaze of "unbelievers." Surely this is far preferable to the bigotry of the Spaniards, who, while they allow heretics freely to enter their temples, and witness their ceremonies, prohibit all public manifestations of other religions throughout their land, and permit no Jew to set foot upon their soil.

Not the least interesting race to be seen in Tangier are the half-savage Arabs of the Desert, who bring merchandise from Fez, and other cities of the interior, down to the coast. Just without the western gate is an open space of ground, whither I frequently resorted to watch the Bedonins and their camels, which are generally assembled here in large numbers, for here they remain in the intervals between their journeys, being taken within the walls only occasionally to receive or to be relieved of their burdens. When they first lie down after their day's journey, their wild conductors tie a cord round the bent knee of one of their fore legs, which, without preventing their rising or moving about, secures them from straying to any distance, and certainly adds to the interest of the scene, for a most amusing figure is a camel on three legs. The Arabs next spread a cloth or haik on the ground, strew some corn on it, and call the beasts one by one to eat; but are obliged to stand by the while, lest another should intrude and a combat should ensue. Though at first it is not very agreeable to stand amid a herd of these animals, with three or four great heads and formidable sets of teeth grinning over your shoulder, you soon learn to feel at ease, for they are exceedingly gentle and obedient. On first making acquaintance with the camel in its native state, you will find an abundant source of amusement in its singular habits, and uncouth attitudes and movements.

These Arabs are thinly clad, seldom with more than a haik wound round them, leaving one shoulder and the breast exposed. Occasionally they wear the *jelab*, the winter dress of Barbary, but, like the cloak in Spain, frequently worn in summer by the lower classes. Their hue is very dark, almost black, but this is from constant exposure to the sun, for I was assured that at their birth their skin is in most instances as white as that of an European; and I see no reason to doubt it, when many of the Moors have fair complexions, and as a race, with the exception of those who are of negro origin, are undoubtedly fairer than the Andalucians. They sleep under small tents, which they carry about with them, or they lie in the open air in the midst of their camels, like a Highland shepherd between his 'tups.' Simple, ignorant, and superstitious as savages, they are withal very civil, good-humoured, and inquisitive. My sketch-book excited their amazement, as they had probably never before beheld a representation of anything animate or inanimate. They turned it over again and again, and examined my pencils and knife with great curiosity; but what seemed most to excite their wonder was the India-rubber, which they took at first to be leather, but its elasticity disproved that; and though they smelt it, bit it, and cut it, they could make nothing of it; and on seeing its effects on pencil-marks they were confounded, and seemed to regard it as the result of magic. On my attempting to sketch them, they betrayed great alarm, running away, and hiding their faces in the folds of their haiks, thinking, like the ostrich of their own deserts burying her head in the sand, by that means to conceal themselves from my view. The Moors have the same superstitious dread of being drawn, which arises either from their imagining it might exert some sinister influence upon them, or from religious scruples, as the Koran prohibits the representation of anything endowed with life. So friendly were they disposed to be, that one insisted on my mounting all his camels in

succession to try their paces, and another followed me into the town, begging me to make a two days' journey with him to his home; adding, that should he ever come to my land, he would inquire for my tribe, and seek out my tent.

As I was one evening passing through the market-place, my attention was attracted by a crowd assembled in one corner. Some were squatting in a circle three or four deep; others were standing behind. In the midst were two men, who, I was told, were comedians. Their only covering was a dirty linen wrapper suspended by a variegated rope from the neck, leaving all above the waist naked. One wore a turban unfolded; the other, who had a long tuft of hair depending behind, had his bare head bound with three or four charms, looking like small cakes of dark soap. Their feats seemed to consist in brandishing short sticks as they stood opposite, repeatedly changing places, vociferating very loudly, and using much extravagant gesture. Now and then they would raise their eyes and hands to heaven, invoking Allah in a frenzied manner; the next moment uttering some droll thing that convulsed the audience with laughter. There seemed to be no acting, strictly speaking, no representation of distinct characters and parts; it was rather an exhibition of buffooneries. One took up a long hollow case like a narrow drum, beat it for a few moments, then threw it aside with laughter, rushing across to his companion. He next took a jar, and squatting down, put it on his lap, stroking, patting, and talking to it for some minutes; then suddenly sprung to his feet, and exchanged places with his fellow. Such are the sons of Thespis in this land of barbarism.

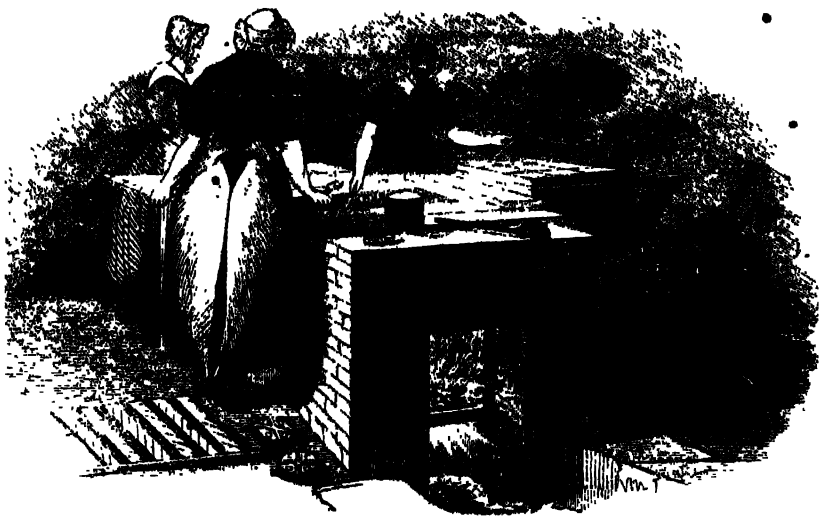


[Jonah.—From the Sistine Chapel.]

MICHAEL ANGELO'S JONAH.

By one of those errors which sometimes occur in printing, and which are so difficult of satisfactory explanation to all unacquainted with printing, the Jonah of West was substituted, at page 309, for the Jonah of Michael Angelo in the Sistine Chapel. The readiest way of correcting the error is by here giving the engraving which was intended to be inserted. There is one accidental advantage arising out of this mistake which our readers may appreciate, in the spirit of our great dramatic poet, that "there is a soul of goodness in things evil." Our error will enable them to compare the extraordinary vigour of the greatest master of sublimity in art, with the correct though comparatively feeble conception of the modern painter.

A DAY AT THE TYNE FACTORIES.



[Casting Lead into flat Moulds for White-lead Manufacture.]

THE Chemical Works and the Glass-Factory, noticed in two of our recent Supplements, are instances of the busy connection which subsists between the various manufacturing towns on the banks of the Tyne. Newcastle, Wallsend, North Shields, and other places on the north bank; Gateshead, Felling, South Shields, and others on the south bank—are all so linked together in respect to their manufacturing and commercial arrangements, that we may almost regard them as one town. It is in this sense that we use the designation "Tyne Factories," in reference to a few brief notices which we have yet to give.

Among the establishments at Newcastle to which we have been favoured with access, and which are fitted to illustrate branches of manufacture not yet noticed in this Magazine, are the

Gallowgate Lead-Works.

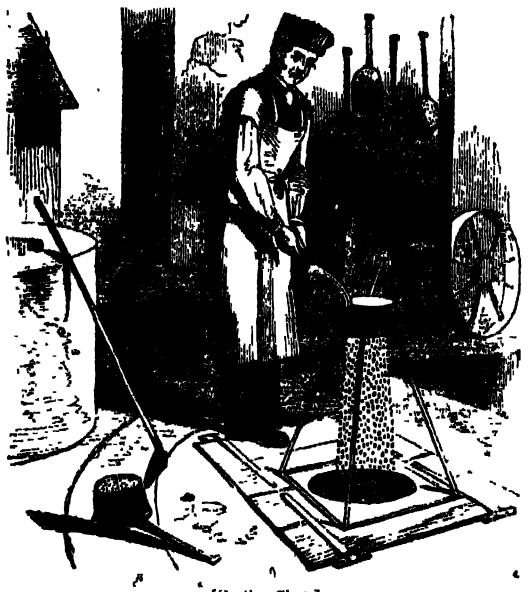
Gallowgate is the name of one of the older or main streets in the northern part of Newcastle; a street which has not yet come within the scope of the magnificent improvements planned and carried out by Mr. Grainger in the central parts of the town, and of which an account was given a few years back in vol. ix. (1840). The term 'Lead-Works' is a short and convenient one, but it would not in itself convey an exact idea of the operations carried on. The establishment in question is a shot-factory, a refinery, a white-lead factory, and a red-lead factory; but all of these have the metal lead for the basis of operations, and therefore the general name becomes a fitting one.

Like most large factories, there is here within the entrance-gates an open court surrounded with buildings in which the manufacturing processes are carried on; some have the comparatively simple apparatus connected with the white-lead manufacture; some the ranges of furnaces for the red lead; some the very curious arrangements pertaining to the shot process; some the large vessels in which silver is obtained from masses of lead; while the group of buildings as a whole illustrates the differences observable as to the employment of men or of women in different processes of manufacture. We will first watch the proceedings of the

Shot-manufacture.—The little spherical shot so familiar to the soldier and the sportsman are produced in a very singular way. Those of large size, such as pistol bullets and rifle balls, being required of regular and exactly equal size, are generally cast in a mould, one at a time, in the same way as other small specimens of casting. Shot of the next smaller size, such as swan-shot, are often produced by casting several at a time; there is a double mould formed, something like a pair of nut-crackers, which, when closed, exhibits a range of little moulds into which the melted lead can be poured, and, when open, allows the shot so made to be removed from the mould. Another mode of making shot is by rolling: a piece of thin lead is cut up into little cubes, and these are placed between two flat stones, the upper of which works over the lower; so that by the pressure and the movement the cubical fragments are worn to a spherical shape. A ruder kind is sometimes made by shaking a number of small fragments of lead together in a bag or box, by which the corners and rough edges are worn away, and an approximate roundness given to the pieces; just in the way that boys' marbles are made. But the most effective and the most highly curious mode now adopted of making the smaller shot is by *granulation*, that is, by allowing melted lead to fall through a series of holes in a kind of colander, and causing the drops thus formed to pass through a considerable space before they finally settle in a vessel of water beneath; the distance being such as to enable the drops to cool and solidify before they reach the bottom. When this plan was first adopted, the shots fell into water almost immediately on passing through the holes; but they were misshapen by this sudden immersion. The first person who worked out the idea of causing the drops to fall through a considerable space was a plumber at Bristol named Watts; and a little tinge of the marvellous accompanies the account given of the invention. This plumber, in the year 1782, is said to have "dreamed" that he made shot by such a method; and he accordingly tried the experiment from the tower of

St. Mary Redcliffe church at Bristol. He succeeded; he sold the invention for a very large sum, planned a magnificent crescent at Bristol, spent all the money in merely preparing the foundations for this crescent, and thus gave origin to a spot which long afterwards bore the name of "Watts's Folly." In more recent times a curious change in the manufacturing arrangements has taken place. Provided the vertical space through which the shot can fall be sufficient, it matters not whether they fall to the surface of the ground from the top of a lofty tower, or *from* the surface of the ground into a pit beneath. The plan originally acted on was the first, of which there is a very elegant specimen in the shot-tower near the foot of Waterloo Bridge, and another at Newcastle; whereas the second plan, though less attractive to the eye, is equally efficacious and more economical: it is the plan carried on at the Gallowgate Works.

In the shot-factory the first thing which meets the eye is a kind of colander supported at a height of a yard or so from the ground on a stand, as in the annexed cut, and having a circular hole in the floor beneath it.

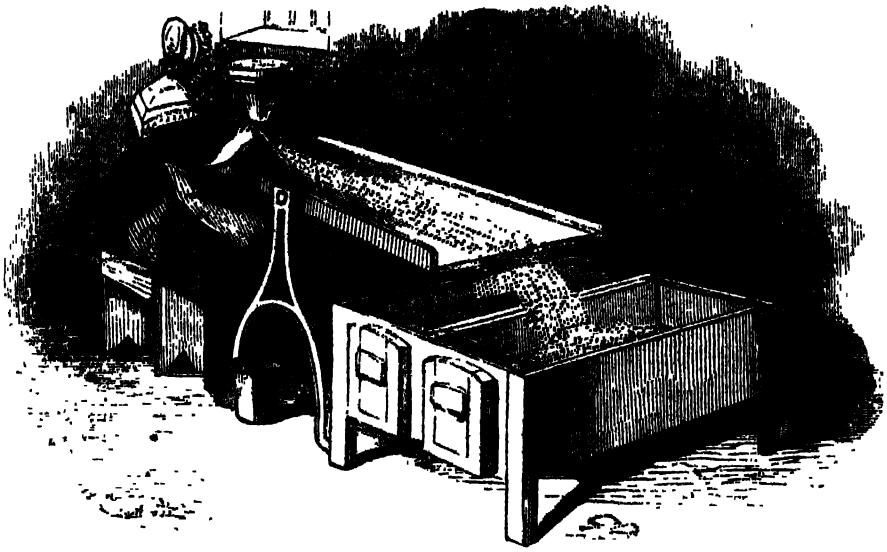


[Casting Shot.]

This hole is a central opening into a vertical pit two hundred feet deep by six feet in diameter, the mouth of which is at most times closed, with the exception of the small aperture fifteen inches in diameter. What we here call the 'colander' sufficiently resembles in shape the familiar culinary vessel so termed, to be conveniently indicated here by that name; the lower part is pierced with holes; and as the size of these holes determines the size of the shot, there is one colander for each size, of which there are as many as fifteen or sixteen, varying from $\frac{1}{4}$ to $\frac{1}{20}$ of an inch diameter.

Lead shot contains a very small per centage of arsenic, to improve its sphericity and solidity. Near the colander is a small furnace or pot, in which the lead and arsenic are melted; and when the fluid metal is ready, the shot-making at once commences. A layer of dross or scum is laid over the holes in the colander, to act as a kind of filter or strainer, or to separate the liquid metal more effectually into small drops. A man ladles the metal out of the pot into the colander, and presently we see a pretty stream of silvery rain descending from the holes in the colander into the pit, through the aperture in the floor; the lead divides into small drops while passing through the dross and the holes, and becomes solid by the time it reaches a vessel of water placed at the bottom of the pit. It might be supposed that the drops would assume an elongated pear shape, or that they would cling together during the descent and form a string of knots; but the composition of the metal, the temperature to which it is heated, the filtering medium put over the holes, and the depth of the descent, are all adjusted for the attainment of a proper sphericity.

When two tons weight of shot have thus fallen into the pit, operations are temporarily suspended; the aperture of the pit is opened, a man is lowered to the bottom, and he sends up all the shot from the water into which they had fallen. The shot are dried by being spread out on steam-heated iron plates; and the different sizes are next separated by sifting through sieves. But with all the care bestowed in the manufacture, imperfect shot are sure to form part of the group: in some specimens two shots cling together; in others the pear shape is exhibited; in others the egg shape; and all these defective shot must be removed. Now this removal is effected by one of the most simple but beautiful contrivances that can be imagined. On one side of the building where these operations are carried on, is a table of highly smoothed and polished iron, capable of being tilted up to any angle, and attended by a woman, to whom the shot are handed up when made, and who sits in front of the apparatus, as in the annexed cut. At one end is a small hopper or receptacle into which the shot are put by this attendant, and from which they descend in a broad stream down upon the table. The table being inclined, they roll down its surface to the lower edge; but in their progress the round and the crooked shot part company. All the well-shapen shot, like good pedestrians, travel regularly down the path, deviating neither to the right nor the left, and reach the bottom in full activity; but the lame or misshapen shot, like bad walkers, waddle from side to side, and waste so much strength that they arrive at the lower end of the table almost spent. What then is the result? The good round shot start from off the table with such force that they descend into a trough removed some little distance from the table; whereas the bad crooked shot fall over the precipice almost vertically into a different trough. So nicely are the angle of the slope and the distance of the troughs regulated, that almost every



[Inclined Plane for separating Shot.]

individual misshapen shot is separated by these means.

The shot retain the dead-white silvery appearance which the melted metal itself had exhibited, but this is exchanged for a darker and more glossy hue before they are brought to market. There is a kind of churn or cast-iron barrel into which the shot are placed with a little plumbago, or black-lead, and by the rotation of this churn for a considerable time the shot give to each other by friction a still more spherical form, and at the same time become coated with a thin and equable layer of black lead, which is rubbed pretty firmly into the surface. They are finally tied up in canvas bags containing two stone, or twenty-eight pounds each, and in that form sent into the market.

Refining.—The refining carried on in connection with the lead manufacture, instructively illustrates the difference in value of various kinds of metal. Most lead, after it has been melted from the ore into the form of oblong blocks or 'pigs,' contains a little silver, and the decision of the question whether or not the silver can profitably be extracted from the lead, depends on the ratio between the one and the other. There is a ratio below which the silver obtained would not pay for the wages and other expenses incurred in the extraction, and in such case the refining process is not carried on: while in some instances the lead is sufficiently rich in silver to yield a handsome return for this process. Sometimes it is found, on assay or analysis, that there is only half an ounce of silver in a ton of lead, while some of the rich veins of lead contain more than a hundred ounces of silver to the ton. If it contains five ounces to the ton (the average of the district being about ten), then it is deemed worth the trouble of refining, where operations are conducted on a large scale.

In order to extract with advantage so small a portion of silver, the manufacturer is indebted to an ingenious process, invented and patented within a few years by Mr. Pattinson of Newcastle. The apparatus consists of a number of large cast-iron pots, holding five or six tons of lead each. In these the lead containing silver is melted, and then suffered to cool slowly, while a workman keeps it continually stirred with an iron tool. As it cools, a kind of crystallization takes place; particles or *crystals* of solid lead fall to the bottom, and are withdrawn by a perforated ladle or colander. These solid particles contain less silver than the original lead, while the remaining fluid part is proportionately enriched. The same operation is repeated again and again upon the remelted crystals, and also upon the residual richer portion, until finally the silver is concentrated into 1-10th or 1-20th of the original bulk of lead, while the remaining part of the lead is almost entirely deprived of the precious metal.

The rich lead thus produced is then subjected to a process called *cupellation*, which consists in heating the metal in a peculiar furnace to a high temperature, and at the same time exposing it to a blast of air, by which the lead is oxidized and comes off as "*Litharge*," while the silver, not being so acted upon, remains in a mass or cake of great beauty and purity, often weighing several thousand ounces. A singular and brilliant appearance accompanies this process. When the silver is in a melted state, it absorbs between its particles many times its bulk of pure oxygen gas; this gas, as the metal solidifies, is expelled, and, escaping from beneath the hardening surface of the mass, forces with it the yet fluid metal from below, and forms lively representations or *models* of volcanic operations, leaving the surface covered with beautiful and fantastic concretions of pure and brilliant silver.

The *Litharge* is either used in the making of flint-glass, or in preparing the salts of lead, which are much employed in dyeing and calico printing; or, being mixed with coal and heated in a furnace, it parts with the oxygen and resumes the metallic form, being then called *Refined* lead.

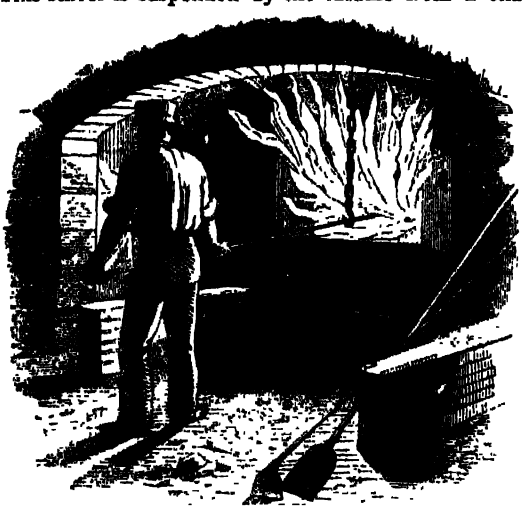
The heat required for cupellation is so high that much lead is volatilized and lost, and the value of Mr. Pattinson's discovery consists in separating the silver without exposing more than a small proportion of the lead to this wasteful process.

We have next to visit other parts of the factory, and notice the production of two substances extensively used in the arts, by the combination of lead with two other agents. One of these is

Red Lead.—This substance is not so absurdly named as 'black lead' and 'sugar of lead,' the first of which contains no lead, and the second no sugar; but still it is not quite a correct name, for it is lead combined with another agent, which totally destroys its customary metallic quality. Red lead, like the litharge which we have just noticed as resulting from the refining, is a combination of lead with the oxygen of the air, but in

different proportions, for red lead, or 'minium,' as it is also called, contains a larger quantity of oxygen than litharge to a given quantity of lead.

When melted lead is exposed to the action of the atmosphere, the upper fluid surface gradually combines with the oxygen, and forms a greenish yellow powder. This is the first stage in the manufacture of red lead, and is carried out in the following manner:—In one of the buildings are several furnaces ranged in a row, of the form called reverberating, and of which a familiar idea may be given by comparing them to bakers' ovens. The pigs of lead (after the silver has been extracted from them) are put into the wide mouths of these furnaces, in the proportion of about a ton and a half of lead to each furnace. Flame is then admitted to act on the lead so as to melt it; and then begins the particular process by which the red lead is produced. A man stands before the open mouth of the furnace, as in the adjoining cut, provided with a long rake or stirrer. This stirrer is suspended by the middle from a chain



['Red Lead.' Stirring.']

overhead, so as to have greater facility of movement; and the man continually works and stirs the molten mass with this instrument. His object is to let every part of the metallic mass come in turn up to the surface, where it can come in contact with the air. This hot and tedious process is continued uninterruptedly for five or six hours; by which time the lead has lost its fluidity, its whitish colour, and its metallic lustre, and has become a greyish yellow powder.

It is not possible to convert the whole of the lead into powder by this means, since that which is formed must more or less prevent the remainder from having contact with the air. The contents of the furnace therefore become protoxide of lead mixed with metallic lead. To remove this metallic lead is the next process. The contents of the furnace are conveyed to an adjoining part of the buildings, where 'grinding stones,' 'settling' cisterns, and tanks point to a very different class of processes. The powder is put into a mill and ground till the lead itself is crushed to a fine state; and the whole is diffused in water in a cistern. The particles of metallic lead, being heavier than the rest, sink to the bottom; while the yellow powder becomes diffused through the water. The water, thus coloured of bright yellow (for the greenish tinge had been caused by the blue lead mixed with the yellow powder) then flows through a series of tanks or troughs, arranged at such a slope that the liquid may be able to deposit its sediment of yellow oxide as it goes along; and this sediment is afterwards collected and dried.

Here we have a tolerably pure oxide of lead, which is called *massicot*; and by causing this to combine with a still larger portion of oxygen, it is converted into red lead, or minium. To effect this, the yellow powder is again put into reverberating furnaces, again heated, again stirred by a rake, and allowed to gather oxygen from the air for a much longer period than before. It changes its colour from a beautiful yellow to a fine red, passing through all the gradations of orange colour; or rather, this orange tint results from yellow particles and red particles being mixed in the same mass, and in different proportions as the process goes on. When finally removed from the furnace, it is ground a second time to a fine powder, and packed for sale.

In this instance, then, we see that heat and air, acting on metallic lead, convert it into *red lead*; but we shall now find that a different agency converts metallic lead into

White Lead.—The use of white lead in the arts is rather a humbling instance of the limit to our practical knowledge. Everybody says that white lead is injurious to the painters who use it; yet no one knows either how to do without it or how to remove its deleterious effects on the system. White lead forms the basis of nearly all the pigments used by the house-painter; and it possesses so many valuable properties for this purpose, that it has outlived all the objections made to it, and all the attempts made to supersede it.

There is a very curious circumstance connected with the manufacture, which would almost seem to show that this substance is not necessarily so deleterious as it is often said to be. Most of the processes are conducted by women. The white-lead manufacture is extensively carried on at Newcastle, and we believe that the employment of women in it is pretty general. Why this is the case we cannot say. time was, before Newcastle made the giant strides it has recently made, when the bricklayers' labourers of that town were of the feminine gender; and women may have accustomed themselves to employments generally undertaken by men elsewhere. But be this as it may, the women employed in the white-lead works at this factory certainly do not give countenance to the charge of unhealthiness brought against this manufacture; they look as healthy as the majority of females among the working classes, and are said to feel but little inconvenience from the employment. As to the circumstances in the social condition of the people which lead to the engagement of females in this way, it is a question too wide to be touched upon here, and therefore we proceed at once to the subject more immediately in view.

White lead is a carbonate of lead; and to make this carbonate, many plans are followed; but it will suffice for our purpose to notice the process as here conducted.

There are about a dozen lofty square rooms, in which this conversion of lead into carbonate of lead takes place; and the manner in which these rooms are gradually filled is singular enough. But we must first notice the form into which the lead is brought. Our frontispiece represents a cauldron or open vessel of iron, round which women are engaged. Pigs of lead are put into this cauldron, and melted by a fire beneath. When melted, the lead is leaden out of the cauldron into flat iron moulds, whereby thin sheets are formed about twenty inches long, four or five broad, and about an eighth of an inch thick. This the women do with great quickness; one stirring the molten lead to keep the surface clear, others casting the flat pieces, and others removing these pieces from the mould. When a sufficient number is collected, the pieces are put into a box or truck, and wheeled along a miniature railway to a place where

they are weighed; and when this weighing is finished, the thin pieces (weighing about five lbs. each) are ready to be applied to the next following process.

In the lofty square rooms a series of strata are built up one over another, to the height of twenty-five feet; and these strata are such as will certainly seem odd to most readers. At the bottom of all is a layer of fine ashes; next upon this is a layer of tanner's spent bark, two or three feet thick; then a layer of earthen pots,



[Setting the Beds for White Lead.]

about five inches in diameter, and containing each a pint of vinegar; then a layer of leaden plates, six in depth or thickness, laid over the open mouths of the pots; then a layer or covering of boards; next a second bed of spent tan, a second layer of pots containing vinegar, a second layer of leaden plates; and so on, until a 'stack,' as it is called, is built up to the height of more than twenty feet. Each layer of pots, with the tan beneath and the lead above, is called a 'heat,' or 'bed;' and the stack contains seven or eight of these heats when filled. There are about sixteen hundred pots ranged in each layer or heat; and four tons of lead in each heat laid on the pots; so that in all the successive series of tan, pots, and lead, there must be a mass of pretty considerable weight. The door of each room, if we may call it a door, is as high as the room itself; and each layer of the materials forms a floor on which the women stand and walk, as in the annexed cut, either to empty or to fill the stack. When all the arrangements are completed, the room is entirely closed up, and left untouched for many weeks.

Then comes the inquiry, what takes place in the stack during this period? The spent bark gradually ferments, and in so doing gives forth a considerable amount of heat (about 180° Fahr.), sufficient to cause the vinegar in the pots to evaporate slowly. This vapour is of a compound and acid character, and appears to act upon the thin sheets of lead placed over the pots in the following manner:—The surface of the lead is first converted into an oxide; this oxide is formed into an acetate by the vinegar; and this again changed into carbonate by carbonic acid gas yielded by the fermenting bark. In some factories other liquids are used instead of or mixed with vinegar, and other sources of heat than fermenting tan; and indeed there is some little chemical complexity involved in this change of metallic lead into white lead; but it will be sufficient for our purpose to know that the whole of the arrangements in the 'stack' are for the purpose of causing the thin pieces of lead to combine chemically with carbonic acid and oxygen to form white lead—a substance totally different from the lead whence it was prepared, since it is a white earthy-looking solid, wholly without lustre or metallic qualities.

As the stack had to be built up piecemeal, so now it has to be dissected layer by layer. The upper part of the door or entrance to the room is opened, and access gained to the interior. The women remove the uppermost sheets of lead, then the earthen pots (which have lost a good deal of their contents by evaporation), then a layer of bark, then a layer of boards, then a second tier of lead and of pots, then the next lower layer of bark; and so on, until the stack is entirely removed and the room emptied. All this is done in a stooping attitude, and is so far rather fatiguing; but there is no further difficulty in the matter.

The thin pieces of lead, thus removed from their prison-house, are perfectly white and earthy at the surface; but on examination they are found to be metallic in the centre. The acid gas has penetrated to a certain depth at both surfaces, but not so deep as to convert the whole mass into carbonate. Under this mode of manufacture there is generally about one half of the mass of lead converted into carbonate. To separate this white portion from the metallic lead, so that the latter may be re-melted and the former brought to the state of saleable white lead, is the next operation. The pieces are carried in flat boxes to another building, where there is a pair of revolving brass rollers working in a large vat of water. Each piece is put between the rollers, which are adjusted at such a distance apart that the white earthy matter is broken or crushed off, leaving the thin metallic film nearly separated from it. All alike fall into the water, the blue lead and the white lead; and a number of persons are then employed to rake and stir the mass to and fro. The white lead becomes suspended in the water, and passes through holes in the false bottom of the vessel; while the metallic lead which remains behind is gathered up, to be re-melted and re-cast into thin plates for the stack.

The thick creamy liquid passes from this vessel to various others, where the white lead suspended in the water is brought to a very fine state; grinding-mills, tanks of running water, and systems of pipes and pumps to convey the liquids to different levels, being among the apparatus employed for this purpose. At length, when brought to a state of very fine division, the white lead is allowed to settle to the bottom of the last vessel through which the liquid flows, and is thence removed in a paste-like state. To dry this paste is the next object of attention. In one part of the factory is a stove-room, so highly heated that a person unaccustomed to the employment cannot remain in it many minutes together; the temperature is indeed about 190° Fahr. Throughout the greater part of this stove-room are a number of iron rails or shelves, so placed one above the other as to contain many thousands of flat earthen dishes. Into these dishes the pasty mass is laded, to the extent of about ten or twelve pounds in each; and the dishes so filled are placed upon the shelves in the stove-room (the stove being at the time cold), there to remain till the white lead is quite dry.

One more building, and we shall have finished our tour of inspection. White lead is brought into the market in two forms: as a dry earthy substance; and as a kind of thick paint or paste ground up with linseed oil. To prepare this latter kind of commodity is the last process. There is in one of the buildings a vessel into which the white lead is placed, together with a given proportion of linseed oil. A stirrer or rake is kept constantly at work in mixing these two ingredients well together into a very stiff paste; and the mass then

flows out through a hole into the space between two grindstones or millstones, where it is ground up to a state of perfect smoothness and equality. To deposit this smooth product in casks, and to pack those casks carefully for the market, finally complete the range of processes.

There is thus, it will be perceived, a good deal of diversity in the ordeals which lead has to undergo in this factory. In one part of the premises the masses of lead are narrowly scrutinized, and made to give up the small but important quantity of silver which they may contain; in another they are made to assume the form of the bright little globules which the soldier and the sportsman make use of; in another the lead is made to give up its metallic character altogether, and to assume a red earthy form, in which there is neither lustre nor resonance nor tenacity; while in a fourth it is caused to assume the white form which is so indispensable to the painter.

We may here remark, that Newcastle is a busy emporium for the lead-trade in all its ramifications. There are extensive lead-mines in the western part of Northumberland; while the banks of the Tyne exhibit a considerable number of factories in which lead is brought to one or other of the many forms in which it is made applicable to the arts.

The north-west part of Newcastle having thus furnished us with a few interesting details, we will next go to the north-east, and glance at the arrangements of a manufacturing establishment, which is, on many accounts, worthy of notice, viz.,

Sopwiths' Cabinet-Factory.

Under general circumstances a cabinet-maker's manufactory is rather a workshop than what we should call a factory. It is usually a room of greater or less length, fitted up with ranges of work-benches near the windows; with stoves for melting the glue and drying the work; and with other appliances for carrying on the work. The processes, too, are rather of a handicraft than of a factory character: the workmen, by the aid of the saw, the plane, the chisel, the indispensable glue-pot, and other implements, working up their rough materials into the elegant forms which are familiar to us. Whether we call a maker of furniture by the rather vague names of "cabinet-maker" and "joiner," or as the Germans do in their word "tischler," by that of "table-maker," his employment of shaping pieces of wood and joining them together is pretty much the same, whether he is making a cabinet, a sideboard, a table, or any other article of furniture.

Were this the only point for notice, we should not enter upon any description here; but there are circumstances which render the cabinet-factory above alluded to worthy of a brief description, because science and art are here brought to bear upon each other in a manner mutually beneficial. One of the proprietors is a mining engineer, whose name is well known in connection with the scientific departments of mining economy, and who has done much to link together the theoretical with the practical in industrial pursuits. What we mean by science aiding art, and art aiding science, will appear as we go on.

The factory to which we are now directing our attention is situated out of the busy centre of Newcastle. It is in a northern suburb called Jesmond; one of those which have shared in the recent advancement of the town by new buildings. On the northern side of a clean and quiet street a large sliding gate gives entrance to an open court-yard, nearly an acre in extent; and opposite to the entrance is a range of buildings in which the manufacture is carried on in its earlier stages; while on the left is another range, appropriated to the finishing processes. The lower floor or stage of the buildings (which are three hundred feet in length) is occupied for the rougher purposes and for storehouses of various kinds, drying and packing rooms; while eastward are the mahogany-sheds, veneer-rooms, and saw-pits for supplying the raw material, occupying another two hundred feet of space. At the angle between the two sides of the building is a counting-house, or manager's room, so placed as to give a sort of "panopticon," as Bentham would have called it; that is, a "view on all sides," or to command a glance along two ranges of buildings and the whole of the court-yard and entrance at once. In various parts of the range are heated rooms for seasoning timber, reservoirs of water for extinguishing fires, and other arrangements on rather a large scale.

Immediately outside the entrance gates is a row of neat little houses, recently built by Mr. T. Sopwith, and inhabited chiefly by the workmen engaged in the factory. The houses of three of the foremen or managers (who, like the foremen in many concerns, are "old stagers," and, as it were, part and parcel of the firm) are placed on each side of the entrance gate. The houses are worthy of a little attention, especially at a time when the public sympathy is so warmly aroused in respect to the humbler dwellings in large towns. Why it is that the cellars of Liverpool, and the wretched hovels found in Manchester, Glasgow, and other manufacturing towns, should be such as they are, is a question too large to be answered briefly. Whether the dwellers cannot pay for better, or whether they cannot appreciate the comforts of better, or whether they cannot find better, because none others have been built, or whether they render bad worse by a disregard to habits of decency and cleanliness—or whether all these are combined—we do not pretend to say; but there can be no doubt that if those who build houses would pay a little more attention to the points which render houses clean and wholesome, they would confer a lasting benefit on those who have to become the in-dwellers, and would probably find in the end that it is quite as cheap to do a thing well as to do it slovenly. Mr. Chadwick's Report on the Sanitary Condition of Towns, and the statements of other writers who have paid any attention to the subject, afford sad evidence of the disastrous results following from ill-arranged dwellings.

The groups of houses are arranged four in a cluster, and are so managed that almost every room has two sides contiguous to the open air, as a means of avoiding the pent-up condition of rooms too generally built in humble neighbourhoods. In each group of four, the two centre houses are of two rooms each, one on the ground-floor and one above it; while the two end houses have four rooms, a front and back on each floor. The four houses are served by two entrance-passages, from each of which is an outlet to a yard behind; this yard, running behind all the four houses, obtains a more free current of air than if there were four very small ones; it is neatly flagged, and is provided with a pump, a dust-pit, coalhouses, and other outoffices, all removed from the houses themselves.

Most of the rooms are fitted so as to combine the comforts of a living and sleeping room, if the occupant cannot afford to have more than one. They are all of very good size, and contain a range, with an oven and boiler; so that the lamentable waste of heat which is so general from English fire-places, is here, in great part, avoided. If a family can afford to have a fire at all, there is abundant proof that, under the ordinary arrangement, much of the heat is absorbed by the brick-work around, instead of being made available for culinary matters; and many a working-man's home might have an increase of little comforts, without any increase of expense, if the English stoves in common use were

more fitted to act as cooking-stoves. The expense would be greater at the outset; but this is precisely the point at which the kindness and consideration of the proprietor of the houses would come advantageously into play, by a little enlarging his outlay. The arrangement of the houses in many minor respects is such as to encourage a free ventilation; and there is a general air of comfort within. The difference in the size of the houses is such as to accommodate persons having different means; since the same entrance-passage gives access on one side to a single room, and on the other to two rooms opening into each other. The general plan of these buildings appears to be very applicable to streets and houses for the labouring classes, a subject to which the attention of the Health of Towns Commission is now particularly devoted.

Returning again to the interior of the factory, we have a few points to mention respecting the operations carried on. The general articles of furniture manufactured, such as sofas, tables, sideboards, &c., involve the same mechanical processes wherever they are made, and do not demand particular description here. The show-rooms belonging to the firm, in the centre of Newcastle, like similar rooms in most large and flourishing towns, exhibit elegant specimens of what can be done in this art, and how a symmetrical piece of furniture can be wrought out of a rough-hewn block of wood. But there are two or three matters rather out of the usual path, which may fittingly be noticed.

Among the works under operation we observed a piece of furniture to which the name of *monocleid* is applied. This we may interpret to mean "single-lock," or "single-key," or "single-opening," and relates to the fact that one single lock fastens all the drawers and doors in a large and complex cabinet. Mr. Sopwith invented this piece of furniture, which may be designated generally a writing-cabinet, chiefly with a view to the wants of men of science or official persons, who have a multiplicity of papers and documents to preserve and to refer to repeatedly. This gentleman has himself the management of an extensive correspondence in relation to mines and engineering; and it was, we believe, to facilitate his own daily business that he contrived this very unique apparatus, the utility of which afterwards led to the establishment of it as a branch of manufacture. When the British Association held their meeting at Newcastle in 1838, the apparatus came under the notice of the Mechanical Section, in a communication which was thus noticed in the 'Athenæum' at the time: "The great loss of time to persons engaged in extensive official business, in consequence of the difficulty of arranging numerous sets of papers, and of obtaining access to them when so arranged, induced the author to take this opportunity of describing a table invented by himself, and which had been extremely serviceable to him. The principle is, that by opening a single lock, the whole of the drawers, closets, and partitions are opened. These are so disposed also as to admit of everything being reached without the person stirring from his seat. They are all entirely closed again by a single spring-lock. It would be impossible to convey a proper idea of this ingenious invention without sectional plans and elevations; but the President and many present expressed their admiration of the arrangements and of the convenience which such a table must be to every person engaged in an extensive correspondence, or having many sets of papers on various subjects. One contrivance is peculiarly worth mentioning. Within this case Mr. Sopwith hangs up his various keys. On any key being removed, a small counterbalance weight or bolt drops down, and remains down until the key is replaced. This bolt effectually prevents the closing of the case. If, then, the person should forget to replace the key which has been removed, he is immediately reminded of it by being unable to close the case. The principle and contrivances are applicable to many various arrangements of drawers and partitions."

There is one singular feature which we noticed in the "monocleid" not mentioned in the above description. The bed of the desk, or the flat surface which forms the sloping writing-desk, is itself the door to one of the closets or recesses of the cabinet. The apparatus may assume any one of many different forms; but the most customary form is that of a writing-table, with several small drawers beneath it, and a cabinet of recesses and drawers resting upon or above it. Now the cover of the largest recess turns on hinges at the bottom, and, according to its disposition, so is the whole apparatus closed or open. When this flap is turned up so as to form a door to the cabinet, all the drawers and doors are closed; when it is turned down so as to form a writing-desk, all the drawers and doors are open. If papers and writings be lying on the desk, this lid may be lifted up without disturbing them, and be made to shut them all up instantly, at the same time fastening all the other parts of the apparatus. The means of effecting this are by bolts and springs which pass down behind and through the various parts, establishing a chain of connection among them all. It is only those who have had much to do with papers and correspondence that can appreciate the convenience of such contrivances as this; and no one was more likely to have invented it than one who is himself so engaged.

A second point which we notice, because it connects the arts with the sciences in a manner rather out of the common way, is the manufacture of certain aids to science at this factory; among which are *levelling-staves* and *geological models*, the one employed in surveying and the other in illustrating mining and geological stratification. The levelling-staff is one of the instruments employed in ascertaining the contour of the ground for various engineering purposes: it consists of a series of rods, sliding one within another like the tubes of a telescope, and having springs and large figures, which supersede the use of the cross-vane, by which so much time was formerly lost. Instruments of this class are so little known except to professed surveyors, that it will suffice to say here that the kind now alluded to remedies certain defects observable in the common staves.

The geological models, however, open a field which ought to be known more or less to intelligent readers generally. Some of these are representations of extensive mining districts, showing not only the surface of the country, but also the various beds of mineral, and the situation and extent of the mines by which they are worked. Others, of a more popular character, and intended for general instruction, are small blocks of wood, a few inches square, composed of mahogany, satin-wood, beech, walnut-wood, and many different kinds of wood glued together. The actual mechanical construction is simply a species of fine cabinet-work, and is carried on by the more skilful of the workmen in the factory which we have noticed; the pieces being cut, and smoothed, and glued, much in the same way as other small specimens of fine wood-work. But the planning and directing are a different matter, and can only emanate from one who is at the same time a good geologist and a good mechanician. Each model represents a group of stratified rocks, such as really occur in nature; the strata being superposed more or less regularly, cropping out at the surface here and there, and exhibiting all the phenomena of veins, faults, upheavings, denudations, and other disturbances of regular stratification. Various coloured woods are employed to represent the different strata; and each model is capable of being dissected into several pieces, so as to show the internal

formation of the group of rocks intended to be imitated.

Whoever pays a visit to the Museum of Economic Geology in Craig's Court (and, being gratuitously opened by the government, it is certainly worth a visit from those who have an hour to spare) may see the manner in which these models are made to illustrate different classes of geological stratification. Mr. Sopwith has arranged the models in groups of six and of twelve each; and, taking this latter group, we find that it is made to illustrate the following points:—Denudation of stratified rocks; Coal strata near Newcastle; Dislocation of strata in carboniferous rocks; Superficial indications of coal; Dislocations of coal strata; Intersection of mineral veins; Surface denudation (or exposure by washing) of mineral veins; and exemplifications, chiefly of various geological phenomena which result from the effect produced at the surface of the ground by the particular angles at which the different strata lie.

It forms no part of our object to dwell on the scientific points connected with these illustrative models; but the models themselves, standing midway as it were between science and art, have called for some notice here, in connection with the factory where they are made. That they are, however, important aids to science is well admitted. Professor Buckland and Sir H. De la Beche have both noticed the advantages furnished by such models as these in practical geology and mining; they are adopted in the Universities as illustrations; and the Telford medal has been awarded to Mr. Sopwith by the Institute of Civil Engineers for the aid they afford to engineering generally.

Potteries.

We will find a little room here to say a few words respecting the potteries of this district, as one among the manufacturing features by which it is distinguished.

The banks of the Tyne and the banks of the Wear, the one river flowing into the sea at Shields, and the other at Sunderland, are seats of the pottery manufacture, generally of the coarser kinds. There are large supplies of clay found in the neighbourhood, fitted for brown ware, and every circumstance connected with the maintenance of manufacturing premises and the shipment of manufactured goods is so favourable, that the potteries of this district can successfully compete with those of Staffordshire in some particular goods, and altogether shut them out from some particular markets. The position of the pottery districts has a marked and striking influence on the foreign commerce to which the manufacture gives rise. Staffordshire lies nearly in the middle of the kingdom, and it is almost wholly dependent on canals for the means of transporting goods to foreign parts. Sound indeed were the reasons which induced the elder Wedgwood to forward the making of the Grand Trunk Canal, and to turn up the first sod with his own hand as the memento of a new era; for to that canal Staffordshire owes very much of what it now possesses. On the other hand, the counties of Durham and Northumberland, being bounded on the east by the sea, and having large navigable rivers flowing past busy towns to that sea, have at once the means of transshipment at command. Hence it has depended on a great many circumstances whether the centre or the margin of the country has succeeded in retaining any particular department of foreign trade. For all the foreign ports eastward of England, or bordering on the German Ocean, the more eastern of our potteries possess an obvious advantage, in respect to the short inland navigation required to bring the goods to the port of shipment; hence the firms at Newcastle, Sunderland, and the adjacent districts have very extensive dealings with Hamburg, and indeed with most of the ports all the way from Holland in the south to Hammerfest in the north; despatching shiploads of pottery at prices which these purchasers could not purchase at in their own countries or from their own countrymen. On the other hand, all those foreign countries which happen to be nearer to Liverpool than to the east coast, or which maintain a busy commercial intercourse with Liverpool, are likely, other things being equal, to see much more of Staffordshire pottery than of Northumbrian or Durham pottery; and we believe that such is the case with respect to Italian ports, among others.

The pottery of the district now under our notice does not comprise the beautiful porcelain, such as Worcester, Derby, and some firms in the Staffordshire district produce. There may be some of this made here; but the staple is wholly of a coarser kind, made to render rough and strong service, and to be sold at a low price. The St. Anthony's Pottery, situated on the northern shore of the Tyne, between Newcastle and Wallsend, is one of those in which a medium kind of ware is made, comprising various kinds of blue, white, and coloured ware, which is packed off to foreign ports in immense quantity. Other houses, again, confine their operations to a coarser kind of ware, in which the clay of the district can be used, instead of the more expensive clay of Cornwall and Devonshire.

As to the manufacturing arrangements connected with these potteries, we need not enter upon them; since they bear a general similarity, so far as they go, to those of Worcester and of Staffordshire, described in two former Nos. (700 and 716). All kinds consist mainly of clay, sometimes fine and sometimes coarse; and nearly all kinds contain flint, as an ingredient which helps to give a hard and vitreous character to the ware. In all, the ingredients are first ground fine while in a dry state, and then ground again in a wet state; but the degree to which this second grinding is carried, and the extent of the precautions taken to produce a fine and smooth mixture, depend upon the fineness of the ware to be made. Then, the clay being prepared, the same potter's wheel, or one of analogous construction, is employed to 'throw' the vessel to be made, whether it be a porcelain cup or one of rougher character; and the same 'handling,' drying, and firing, and glazing—modified to suit the altered circumstances—are carried out more or less in all. It is perhaps in the decorative parts subsequent to the firing that the chief differences, so far at least as a common observer can detect, are seen to exist; though, of course, every stage of the operations has its own peculiar gradations of excellence, according to circumstances.

As to the commercial features of the manufacture, taken with reference to the country generally, and not to its local distinctions, they are very interesting. According to the authority of Mr. M'Culloch, there were, in 1841, more than a million pieces of English earthenware (comprising all the various kinds) exported to Australia, a million and a half to Denmark, and an equal quantity to Ceylon; more than two millions each to Germany, Holland, the English West Indies, and the foreign West Indies; more than four millions to the North American Colonies, five millions to Brazil, and nineteen millions to the United States; together with minor quantities to other countries, making in the whole fifty-three millions of pieces!

We have yet a little more to say respecting the busy Tyne and its manufactures; but enough for the present.



[Daniel.—From the Sistine Chapel.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXIX.

MICHAEL ANGELO—*continued.*

THE same Pope Paul III. had in the mean time constructed a beautiful chapel, which was called after his name, the chapel *Paolina*, and dedicated to St. Peter and St. Paul. Michael Angelo was called upon to design the decorations. He painted on one side the Conversion of St. Paul, and on the other the Crucifixion of St. Peter. But these fine paintings—of which existing old engravings (to be found in the British Museum) give a better idea than the blackened and faded remains of the original frescos—were from the first ill-disposed as to the locality, and badly lighted, and at present they excite little interest compared with the more famous works in the Sistine.

During the period that Michael Angelo was engaged in the decoration of the Pauline Chapel, he executed a group in marble—the Virgin with the dead Redeemer and two other figures—which was never completely finished. It is now at Florence behind the high altar of the church of Santa Croce. It is full of tragic grandeur and expression.

With the frescos in the Pauline Chapel ends Michael Angelo's career as a painter. During the remainder of his life, a period of sixteen years, we find him wholly devoted to architecture. His vast and daring genius finding ample scope in the completion of St. Peter's, he has left behind him in his capacity of architect yet greater marvels than he had achieved as painter and sculptor. Who that has seen the cupola of St. Peter's soaring into the skies but will think almost with awe of the universal and majestic intellect of the man who reared it?

There is a striking anecdote of Mrs. Siddons, which at this moment comes back upon the mind. When standing before the Apollo Belvedere, then in the gallery of the Louvre, she exclaimed, after a long pause of silent admiration, "How great must be the Being who created the genius which produced such a form as this!" a thought characteristic of her mind, but more fitly inspired by the works of Michael Angelo than by those of any artist the world has yet seen. They have impressed upon them a character of greatness, of durability, of sublimity of invention and consummate skill in contrivance, which fills the contemplative mind, and leads it irresistibly from the created up to the Creator.

As our subject is painting, not architecture, we shall not dwell much on this period of the life of Michael Angelo. In the year 1544, being then in his seventy-second year, he was appointed to the office of chief architect of St. Peter's by Pope Paul III., and he continued to discharge it through the pontificates of Julius III., Pius IV., and Pius V. He accepted the office with reluctance, pleading his great age and the obstacles and difficulties he was likely to meet with from the jealousies and intrigues of his rivals and the ignorance and intermeddling of the pope's officials. He solemnly called heaven to witness that it was only from a deep sense of duty that he yielded to

the pope's wishes; and he proved that this was no empty profession by constantly refusing any salary or remuneration. Notwithstanding the difficulties he encountered, the provocations and the disgusts most intolerable to his haughty and impatient spirit, he held on his way with a stern perseverance till he had seen his great designs so far carried through that they could not be wholly abandoned or perverted by his successors.*

When his sovereign the Grand Duke of Florence endeavoured, by the most munificent offers and promises, to attract him to his court, he constantly pleaded that to leave his great work unaccomplished would be on his part "a *sin*, a *shame*, and the ruin of the greatest religious monument in Christian Europe." Michael Angelo considered that he was engaged in a work of piety, and for this reason, "for his own honour and the honour of God," he refused all emolument.

It appears, from the evidence of contemporary writers, that in the last years of his life the acknowledged worth and genius of Michael Angelo, his widespread fame and his unblemished integrity, combined with his venerable age and the haughtiness and reserve of his deportment to invest him with a sort of princely dignity. It is recorded that when he waited on Pope Julius III. to receive his commands, the pontiff rose on his approach, seated him, in spite of his excuses, on his right hand, and while a crowd of cardinals, prelates, ambassadors, were standing round at humble distance, carried on the conference, as equal with equal. The Grand Duke Cosmo I. always uncovered in his presence, and stood with his hat in his hand while speaking to him.

One of the most beautiful anecdotes recorded of Michael Angelo in his later years, and one of the very few amiable traits in his character, was his strong and generous attachment to his old servant Urbino. One day as Urbino stood by him while he worked, he said to him, "My poor Urbino! what will thou do when I am gone?" "Alas!" replied Urbino, "I must then seek another master!" "No," replied Michael Angelo, "that shall never be!" and he immediately presented him with two thousand crowns, thus rendering him independent of himself and others. Urbino, however, continued in his service, and when seized with his last illness, Michael Angelo, the stern, the sarcastic, the overbearing Michael Angelo, nursed him with the tenderness and patience of a mother, sleeping in his clothes on a couch that he might be ever near him. The old man died at last, leaving his master almost inconsolable. "My Urbino is dead," he writes to Vasari, "to my infinite grief and sorrow. Living, he served me truly, and in his death he taught me how to die. I have now no other hope than to rejoin him in Paradise!"

The arrogance imputed to Michael Angelo seems rather to have arisen from a contempt for others than from any overweening opinion of himself. He was too proud to be vain. He had placed his standard of perfection so high that to the latest hour of his life he considered himself as striving after that ideal excellence which had been revealed to him, but to which he conceived that others were blind or indifferent. In allusion to his own imperfections he made a drawing, since become famous, which represents an aged man in a go-cart, and underneath the words "*Ancora impara*," "still learning."

He continued to labour unremittingly, and with the same resolute energy of mind and purpose, till the gradual decay of his strength warned him of his approaching end. He did not suffer from any particular malady, and his mind was strong and clear to the last. He died at Rome, on the 17th of February, 1563, in the eighty-ninth year of his age. A few days before his death, he dictated his will in these few simple words, "I bequeath my soul to God, my body to the earth, and my possessions to my nearest relations." His nephew, Lionardo Buonaroti, who was his principal heir, by the orders of the Grand Duke Cosmo, had his remains secretly conveyed out of Rome and brought to Florence; they were with due honours deposited in the church of Santa Croce, under a costly monument, on which we may see his noble bust surrounded by three very common place and ill-executed statues representing the arts in which he excelled — Painting, Sculpture, and Architecture. They might have added *Poetry*: for Michael Angelo was so fine a poet that his productions would have given him fame, though he had never peopled the Sistine with his giant creations, nor "*suspended the Pantheon in the air*."* The object to whom his poems are chiefly addressed, Vittoria Colonna, Marchioness of Pescara, was the widow of the celebrated commander, who overcame Francis I. at the battle of Pavia; herself a poetess, and one of the most celebrated women of her time for beauty, talents, virtue, and piety. She died in 1547. Several of Michael Angelo's sonnets have been translated by Wordsworth, and a selection of his poems, with a very learned and eloquent introduction, has been published by Mr. John Edward Taylor, in a little volume entitled 'Michael Angelo a Poet.'

* This, however, applies only to the stupendous dome; his design for the façade, and even the original form of the church, having been subsequently altered.

* The dome of the Pantheon, which appears self-sustained, had from the time of Augustus Cæsar attracted the wonder and admiration of all beholders as a marvel of scientific architecture. Michael Angelo had said, on some occasion, "I will take the Pantheon and suspend it in the air;"—and he did so.

THE PRECIOUS METALS IN RUSSIA.

[Concluded from p. 323.]

As the silver-mines of Russia belong principally or almost wholly to the emperor, a much more strict and rigorous system is pursued than where, as in the gold-mines, the operations are left to private speculation.

Mr. Cottrell, in the course of his journey through Siberia, visited the emperor's silver-mines at Zoumogorsk. These mines consist of a series of subterranean caverns and long galleries. After a descent by a staircase upwards of three hundred feet deep, there occurs a gallery nine hundred feet long, at the end of which is a water-wheel forty-two feet in diameter. This wheel, which is called the *prebrawchenska*, is set to work by water brought along two canals excavated under ground; and the wheel itself is employed in lifting the silver-ore to the mouth of the mine. There are three other water-wheels in different parts of the mine, to facilitate the operations. Farther on, galleries are cut in every direction, leading to other shafts which have ceased to be worked.

These mines have been worked above a century, and are becoming almost exhausted, yielding only one part of silver from two hundred thousand parts of ore or rock. The workmen employed are serfs of the crown, who receive two roubles a month each, besides twelve puds of flour monthly, and house-rent free. The labour is not very excessive: the works are going on night and day, but three sets of workmen are employed, who relieve each other every eight hours, so that no one works above eight hours in the twenty-four. These mines have produced altogether, during the period of rather more than a century that they have been crown property, about fifty thousand puds of silver, and seventeen hundred puds of gold, besides lead and other minerals of more or less value. At present the net

produce is supposed to be worth about thirty thousand pounds sterling annually. The establishment is on a large scale, employing in the laboratory part alone about three hundred men; and the arrangements are planned with the most perfect regularity.

The mode of procuring silver from the crude substance which contains it is very different from that adopted in respect to gold, arising from the different state in which the two metals present themselves. The gold, as we stated in the former article, is found mixed up with grains of sand; and the mode of separating it is as follows:—On an inclined plane is placed a large wooden machine formed into different compartments, which are divided off by large iron combs. The first of these combs is coarse and open, as the material to pass through it is composed of pieces of quartz, stone, and sand, mixed together. Gold is generally found in the quartz, as well as interspersed among the fragments; and to obtain the former, the quartz is bruised into moderate sized pieces; but the time employed in so doing is often greater than the value of the gold will repay, and therefore a good deal of the gold is voluntarily sacrificed. When the auriferous fragments are placed in one of the compartments, water is poured on the mass, and stirred about; the larger pieces of stone and much of the sand separate, while the heavier particles of gold fall to the bottom. Again and again is this washing performed, until all the sand is washed away and the particles of gold are left nearly in a pure state. Of this mode of proceeding Mr. Cottrell says that it "is very simple, though improvements in machinery would diminish the expense considerably; and what is of more consequence, from the want of workmen, enable them to increase their operations considerably, which must now be limited in proportion to the number of labourers they can obtain. We believe it would be a most profitable speculation for any clever inventor of machinery to go there, to devise some new plan for clearing the materials from which the gold is extracted; and we are convinced he would make his fortune, as he might obtain a patent as easily as in this country." Not only are grains of gold found in this way mingled up with grains of sand and small pieces of stone, but occasionally pieces of six or seven pounds' weight are found; and on one occasion a mass weighing twenty-four pounds was found almost wholly pure gold.

But with respect to silver, the mode of extraction is very different. It is found in a very hard rock of granite and porphyry. This rock is in the first place blasted by means of gunpowder: and the masses thus separated are broken up into small pieces with hammers. These smaller pieces are finely pounded by large hammers worked by machinery. The stone so pounded is put into furnaces for the separation of the metallic particles from the dross: this is done in immense smelting-houses, where a current of air is brought in from openings above to act the part of bellows, and create a draught in the furnace below; from whence the substance is poured out, cleared of its baser parts, but apparently not much more purified than when it was put in. The next process takes place in another furnace, where all the metallic particles, except the silver, are removed. Lastly the nearly purified silver is put into a doubly-heated refining furnace, called a *treib-ofen*, together with pieces of lead, which, when melted, draw off with them any remaining drossy particles that may have escaped the previous processes; the silver, being the heavier metal, sinks to the bottom of the furnace, where it is left till cold. The silver, when taken out cold from the furnace, is forwarded to the Mint at St. Petersburgh, where a further process of refining takes place, to separate from it the particles of gold, which are always found with the silver in greater or lesser quantity.

In the neighbourhood of Barnaoul, too, there are silver-mines belonging to the crown, the produce of which is sent to that town for smelting into large bars. Five hundred men are employed in the laboratory, which is a quarter of a verst square. One of the smelting-houses is three hundred feet long, and another nearly four hundred feet; they are very wide, and have several tiers of furnaces, which are supplied by a staircase behind, and provided with bellows of most gigantic dimensions. The annual produce is stated at about two hundred and fifty puds of silver, and a million of other metals, principally lead, copper, and iron. When the silver is sent to St. Petersburgh, gold is extracted from it in the proportion of about twenty-five puds of gold to a thousand puds of silver. There are a hundred and fifteen smelting-ovens in all, twelve large open hearths, twelve refining-furnaces, five furnaces for separating the copper, and fourteen calcining-ovens. Four hundred thousand puds of coal for the refining-furnaces, and five million puds for the other furnaces and ovens, are consumed annually.

The whole population of the province or government of Tomsk, amounting to a hundred thousand, are more or less employed in these various mining operations; for, besides the government officials, the miners, and washers, and the refiners, there are large bodies of persons constantly employed in transporting the ore to the works, and the metal from the works to different parts of the empire; so that a district in the heart of Siberia, which we are apt to picture to ourselves as being only the scene of horrors, exiles, privation, and labour in chains, is really a bustling and flourishing place.

In one or two districts farther west than those noticed above, there are other establishments for working mines of the precious as well as those of the inferior metals. At the flourishing town of Ekaterineburg, situated at the foot of the mountains which separate Siberia from Russia proper, are some very large establishments of this kind. Mr. Cottrell, in the course of a western journey of four thousand miles from Irkutsk to St. Petersburgh, stopped a little while at this town, and thus speaks of some of the operations in its neighbourhood:—"There are two establishments in the neighbourhood, belonging to individuals, which are really royal. The one between thirty and forty versts' distance, belonging to M Jacoblef, a gentleman of Petersburgh, perhaps, in absolute ready money, the wealthiest individual in the world; and the other, three hundred versts off, which we had not time to visit, belonging to M. Demidof, who is known personally to many of our readers, and to many more by the fame of his colossal fortune, which is, however, far smaller than that of M. Jacoblef. The establishment of the latter gentleman is a complete town. He employs several thousand workmen, who are all well-lodged and fed. There are for their use an hospital, church, various schools, a public dispensary, clergy, medical men, schoolmasters, and very good shops of every kind, all belonging to the proprietor, and kept up at his expense. The director of the whole has a salary of fifty thousand roubles a year; and the appearance of comfort and good management that pervades it, is the best proof that the establishment is flourishing, not less as regards the employer than the employed."

Gold-mines were part of the wealth here alluded to as possessed by M. Jacoblef; but iron constitutes the principal element of his commercial greatness. The large works of M. Demidof relate to copper, platinum, and malachite. In 1840 he brought into the market a

hundrod puds of platinum—an enormous quantity, when the costly value of this metal is taken into account.

These details seem to show that there are agencies at work in the heart of the Russian empire, which will give to it a commercial character not to be despised, however small when compared with that of England. From the descriptions given by Mr. Cottrell, it appears that the population in these manufacturing towns, comprising a large section of the middle classes to which manufactures are sure indirectly to give rise, is far in advance of the population of other towns in the empire, where the military and government officials are the only important persons in the place. He says that at Barnaoul, the centre of the busy smelting and refining district, there are more persons of literary acquirement than in all the rest of Siberia put together; although Tobolsk, Irkutsk, Tomsk, &c., are the great government stations of the country, and have large numbers of officers and official agents.



[Gateway at Co dry]

RAMBLES FROM RAILWAYS.

THE ADUR, ARUN, AND WEY.—No. V.

ON leaving Amberly a bye-way may be taken over the meadows to Hardham. It is hardly worth while to keep by the river to that place, as there is nothing attractive along it, and it leads us much out of our direction. The path to Hardham is not a very easy one for a stranger to find, but he will meet with some countrymen—and the Sussex peasantry are among the civilest of our peasantry, and neat hands at pointing out the way—so much so indeed, that it is hardly worth while carrying a map in rambling through this county. At Hardham there was a priory of Black Canons, founded in the reign of Henry III.; some slight remains of the building, converted into a farmhouse, still exist in the meadows opposite the church: they have little to interest about them. Hardham church is small, and not remarkable in any respect; the several historians of Sussex—Dallaway, Horsfield, and Shobert—say that there is in the churchyard a yew-tree whose trunk, hollow from age, measures twenty-four feet in circumference at the height of four feet from the ground; but there is certainly no such tree there now, nor any appearance of any such having recently existed. From the river Arun at Hardham a tunnel is carried, for the purposes of navigation, to the Rother, which river it meets near Stopham. The Arun itself winds round by Pulborough, where are some remains of a larger mansion, called Old Place: it belonged to the Apsley family, and was erected in the reign of Henry VI. It was a handsome edifice, partly timber, large square and bay windows; it en- and must have been a place of some y little of it is now standing, and that is in a defaced and patched condition, it being used as a cottage. Between Pulborough and Stopham the Arun is joined by the Rother, and with this river as a guide the rambler may quit the Arun awhile, in order to visit Petworth, and perhaps pursue the stream through the romantic country for a few miles beyond that town. The shortest way, however, to reach Petworth is, after crossing the bridge, to take the road on the left, just under Pulborough church; this leads past Stopham, where is a little Norman church pleasantly situated on a hill, with a fine yew in the churchyard and a noble prospect from the hill above. Fittleworth and Egdean have next to be passed, and then Petworth is soon reached. The way is not long, and is very pleasant: two or three field-paths may be taken, which will somewhat lessen the distance.

Petworth is a thoroughly respectable, clean town; the houses are well built, and the public buildings are substantial edifices. Much of the present appearance of Petworth is due to the munificence of the late Earl of Egremont, who expended above 15,000*l.* upon its improvement. The church, which he almost rebuilt, has a tall spire, more recent than the church, and a sort of imitation of that of Salisbury Cathedral; from its height, and from the church standing on elevated ground, it is seen over a wide circuit. The fine mansion of the Earl of Egremont (now occupied by Colonel Wyndham) is the grand attraction at Petworth. Cobbett, in his 'Rural Rides' (p. 64), thus speaks of it:—"Lord Egremont's house is close to the town, and, with its outbuildings, garden-walls, and other erections, is perhaps *nearly as big as the town*, though the town is not a small one. The park is very fine, and consists of a parcel of those hills and dells which Nature formed here when she was in one of her most

sportive moods. I have never seen the earth flung about in such a wild way as round about Hindhead and Blackdown; and this park forms a part of this ground." The park is very extensive, its walls being more than twelve miles in circumference. The house, which is comparatively recent, is not to be praised for the elegance of its architecture, yet its size renders it imposing; and some conception of its size may be formed from the fact of there being, in the front of the house, twenty one windows in a line to each story, and there are three of these stories. But the magnificence of the interior fully compensates for what may be wanting in the exterior; and permission to view it is most freely and liberally given. We regret that our limits prevent us describing the place somewhat fully; but we must not forget that we are already diverging a little from the line we marked out, and shall therefore only mention two or three of the leading features - just sufficient, we hope, to induce the rambler who may be in the vicinity to visit it. As might be expected from the size of the house, there are a great many rooms, and nearly all of them have some objects of art of considerable attraction. It would evidently be vain to attempt even to name the various rooms; but there is one we must mention. This is a magnificent apartment, sixty feet long, twenty-four wide, and twenty high, and is generally called "the carved room," from its being profusely adorned with the carvings of the famous Grinling Gibbons. This room is probably unmatched for its carved-work in the world, and no one who has not seen it can form a conception of the exuberant fancy and exquisite skill of that prince of wood-carvers; and once seen, it can never be forgotten. Festoons of flowers, fruits, shells, birds, foliage in every variety and play of line, with vases graceful as Grecian artist ever moulded, are suspended from the walls and ceilings in endless combinations. There is a painful interest attached to one of the finest of these festoons, inasmuch as Gibbons's favourite pupil, Selden, lost his life in rescuing it from a fire which occurred here while the work was in progress. As we have said, the fertility of Gibbons's fancy is amazing. Gilpin, we believe, lamented that Gibbons was not born in an age of Gothic architecture; and all who look on his works will feel that his marvellous wildness of invention could only in such an age have had full scope. It must be admitted, that his luxuriant foliage and endless diversities of form appear a little incongruous within the stiff walls of a classic room. In looking at the carvings — so mechanical and pattern-like — of the present day, one cannot but regret that he is not alive to fitly use the noble opportunity afforded by our new Houses of Parliament. Other rooms at Petworth are also adorned with his carvings; and altogether the collection of them far surpasses any other in England. We ought to mention that an artist has been, for some time here, fitting up every portion unoccupied with the works of Gibbons, that is suitable to be so adorned, with carvings; and his productions are very beautiful and admirably executed, though they do not approach those of Gibbons in originality or fertility of invention, or richness of fancy.

These rooms also contain a large number of antique statues, collected for the then Earl of Egremont by Gavin Hamilton, at Rome, between 1750 and 1760. They were, when purchased, for the most part in a mutilated condition, but were restored by the addition of noses, fingers, hands, feet, and sometimes even larger members, by two Italian sculptors, Cavaceppi and Pacilli, much in request for that kind of skill, very fashionable about that time. There is, too, an interesting selection of works by English sculptors, made chiefly by the late earl. Among them are Flaxman's almost sublime group of 'Satan and the archangel Michael,' a work unequalled in English sculpture; and his graceful 'Pastoral Apollo.' Then there are other statues by Carew, &c., with busts by Nollekens, Chantrey, and others famous in that line of art. There is also an excellent collection of paintings by Claude, Cuyp, Rubens, and others of the old masters; and an unmatched series of portraits of the Percies by Vandyke and others. The Vandykes at Petworth are famous all the world over. We ought to have observed, in speaking of the "carved room," that it contains a great many fine portraits and other pictures in the carved, and of course ungilt, frames of Gibbons. Besides the paintings by the old masters, the late earl, the most munificent patron English artists ever had, formed a fine collection of works by English painters. Among them are several by Reynolds, Gainsborough, Romney, Fuseli, Hilton, Leslie, Callcott, and Turner. There is perhaps no other collection, except his own, that contains so many of Turner's pictures; and the selection is a most choice one, displaying almost every variety of his style, from the Claude-like quiet of his earliest productions, to the exuberant splendour of his later. Few who only know him from the singular and extravagant works he now yearly displays at the Royal Academy Exhibition, will be prepared for the sober and classic graces of those they will see by him at Petworth; and scarce any will unite with his thoroughgoing admirers in accounting his latest works his best.

The number of works of art and taste at Petworth is so great as almost to bewilder the visitor; they not merely fill a gallery, but crowd every room. We should like to talk awhile beside some of the pictures and statues, but we must not venture; if we began, we could not break off in a few sentences, and we must be as brief as possible in this paper. We can assure our readers, that if they desire to examine a large, varied, and excellent collection of works of art, they cannot do better than visit Petworth. There is also shown a curious chapel, belonging to the old mansion: it is the burial-place of the Percies, to whom it formerly belonged. When the Percies became extinct, Petworth passed by marriage to Charles Seymour, Duke of Somerset, and by his second daughter to the Wyndhams, in which family it remains.

There is some delightful scenery about Petworth; and we will carry our readers a little farther along the Rother to Easebourne, which is little more than three miles from Petworth, if the west road be followed. At Easebourne is Cowdry Park, in which are the remains of a mansion erected in the reign of Henry the Eighth, and at one time one of the most magnificent in the kingdom: in it Edward the Sixth was "honourably entertained by Sir Anthony Browne," in 1547, and Elizabeth with much magnificence by Lord Montacute (Montague), in 1591. An account of the ceremonies attending the reception of Elizabeth, with the verses with which she was greeted, was published at the time; but we need not make any quotations, as there is a considerable similarity in most of these affairs, and a pretty full account of the queen's progresses was given in the last volume of this magazine. The old mansion was preserved with due care and an honourable pride till the year 1793, when it was destroyed by a fire that occurred through some negligence of the servants left in charge of the house. Lord Montague was at the time travelling on the Continent, and his return being shortly expected, the house was being set in order; the portraits, of which there was a collection of great interest, had been removed from the rooms in which they commonly hung into the north gallery, and this gallery was, on the night of September 24th, discovered to be on fire, but too late to save any of the valuable contents. Attempts were made to

detach this part of the building from the remainde, but the solid state of the masonry rendered it impracticable. On the morrow, little more than a few bare walls were left standing. Beside the portraits we have mentioned, there were a good many other pictures in various rooms, some of which were saved, but the greater part were destroyed. On the walls of one of the apartments were some curious paintings in fresco, illustrative of events in English history in which the family had been concerned, and a curious pictorial chronicle of the leading occurrences in the life of Sir Anthony Browne; these, with a representation of the reception of Elizabeth, were also lost. The noble owner of the mansion never heard of his loss. The intelligence was of course immediately sent to the Continent to him, but before it reached him he had, by a terrible accident, lost his life. In company with Sedley Burdett (the brother of the late Sir Francis) he attempted to pass the falls of Schaffhausen in a boat, and both were drowned, October, 1793. In the 'Annual Register,' 1793, there is a full account of the fire: and the 'Vetusta Monumenta,' vol. iii., contains four engravings of Cowdry House as it appeared before the fire, and a list of the paintings saved. We give an engraving of the present appearance of the grand entrance. The ruins have been, with good taste, suffered to remain undisturbed. The new house is built at a short distance from them; it is not an elegant fabric. In the park, which was laid out by Capability Brown, are some very large trees, especially oak and chestnut, with some firs of great height. Easebourne Church, which is a neat little rustic edifice, stands in the park. We will now return to our Arun; but we strongly recommend the tourist to vary the route by continuing along the Rother by Midhurst, the birthplace of the unfortunate Otway, whose remains lie in the little church of the adjoining parish of Woolbeeding,—and then by some bye-roads and over the hills into Hampshire by Milland to Selborne, the locality of Gilbert White's delightful book; and from thence to Alton, famous for its ale, about a mile from which is the source of the Wey, which river the rambler may then follow. He will find this one of the pleasantest routes he can desire, and it will not very much lengthen his journey. Some parts of it about the 'Hangers' are almost unequalled in their way.

VEHICLES AND TRAVELLING ON THE CONTINENT.—No. I.

In a former Number (627) we gave a brief notice of the customary modes of travelling in Turkey, illustrative of the peculiar features which the semi-civilized state of that country has given to all such arrangements; and in a subsequent article (No. 710) the system of dawk travelling in India, wholly different in every respect, was described. We now proceed to notice the chief peculiarities which distinguish the vehicles and the modes of travelling on the Continent generally. The excellent and well-arranged 'Handbooks' published by Mr. Murray, together with details from other quarters, will enable us to do this. It is only in so far as the methods differ from those in England that they will be noticed here.

The private carriages belonging to individuals, whatever may be their varieties of shape, may all be placed in one class, since the regulations of the road are pretty much the same for all. The accommodations at the roadside inns may be more or less complete, and the relays of horses more or less numerous; but the characteristic features of a country are not so much seen here as in hired vehicles. We will, therefore, proceed at once to notice the French

Malle-Poste.—This is the mail-coach of France, and is a modern improvement on the heavy diligence of earlier times. The malle-postes are kept up at the expense of the government, and travel along the great roads of France to carry the mail. They are divided into two sections, according to the route which they take: the first section including those which start from Paris, and the second comprising those which traverse the more distant routes. Those of the first section radiate in fifteen different directions from Paris, proceeding respectively to Calais, Lille, Valenciennes, Sedan, Torbach, Strasburg, Besançon, Lyons, Moulins, Limoges, Bordeaux, Nantes, Brest, Cherbourg, and Havre. The number of hours which the coaches take to traverse these distances, varies from thirteen (Paris to Valenciennes) to forty-four (Paris to Brest). They all start from Paris at six o'clock in the evening, and regulate their return journeys so as to reach Paris between four and six o'clock in the morning. The second section comprises thirteen mail-routes, all in the more distant parts of France, such as from Bordeaux to Bayonne, from Limoges to Toulouse, from Moulins to Marseille, &c. Thus an "overland" traveller, travelling from England to Alexandria *viâ* France, and adopting this mode of conveyance, traverses three mail-routes:—Calais to Paris (eighteen hours), Paris to Moulins (twenty-three hours), Moulins to Marseille (forty-three hours). Any adoption of railway travelling will of course materially reduce this extent of time; but if the malle-postes be adopted throughout, the time of travelling from Calais to Marseille is about eighty-four hours, without reckoning stoppage at Paris.

These malle-postes are not so available to travellers as the English mail coaches, since there is generally only accommodation for two or three passengers. The vehicle itself is a sort of stout baroueche, able to contain usually two inside passengers, while a third sits by the side of the conductor, outside and at the back of the carriage, the front seat being occupied by the driver. The coaches are painted light red, and are drawn by four horses with tolerable harness. The rate of travelling is very rapid, varying from nine to twelve miles an hour; this is shown by the route from Calais to Marseille, not far short of eight hundred miles, being performed in eighty-four hours. This rapidity and certainty make the malle postes to be much sought after; and, as the places for passengers are so very few, it is customary to secure a place many days beforehand. Half the fare is paid when the place is taken, and the other half before starting. A place cannot be *secured* at all, unless for three-fourths of the entire distance travelled by the malle. The stoppages are very short, and the luggage allowed to each passenger very limited. The fare is 1 75 francs the myriametre, about equivalent to the outside fare on an English mail—threepence per mile.

Diligences.—These are the travelling vehicles which an English reader is most apt to associate with the Continent, and especially with France. They are the stage-coaches of France, each one having an assigned route to go over in an assigned number of hours, and each having a number of seats or places, which may be taken separately by passengers, as in England.

The diligence has been designated as "a huge, heavy, lofty, lumbering machine, something between an English stage and a broad-wheeled waggon." None of our English stage-coaches have more than two compartments or qualities of seat—"inside" and "outside;" but the French diligence has four—the *coupé*, the *intérieur*, the *rotonde*, and the *banquette*. There are three carriage-bodies joined together, and wholly distinct; the front one of which is called the coupé; it is shaped like a chariot, or postchaise, holding three persons, whose faces are in the direction which the di-

ligence is following. If a party can secure all three places to themselves, they travel with nearly as much privacy and comfort as in a private carriage, since the coupé is wholly separated from the other parts; and as an equivalent the fare is higher than in other parts of the vehicle. There is nothing in our English stages analogous to the coupé; but the intérieur is equivalent to our "six inside;" it is a very closely boxed up arrangement, and is very hot in summer. Behind the intérieur is the rotonde, the worst part of the vehicle —"the receptacle of dust, dirt, and bad company." It is a curious exemplification of difference of taste between different countries, that that seat which is the cheapest of all, and which is avoided by Frenchmen, is the one which English travellers of the male sex like the best. This is the banquette, a seat perched up on the roof of the coupé, tolerably well protected from rain and cold by a hood and a leathern apron, but somewhat difficult of access. It affords a comfortable and roomy seat by the side of the conductor, and gives the passenger a good "look out" over the country which he is approaching. The French dislike outside travelling, and the banquette is generally occupied by persons of humble class; yet it is not unfrequent for Englishmen to seek out this in preference to any other part of the vehicle. The comparative arrangements in the two countries exemplify the difference of taste: in England, a first-class stage carries four inside and twelve out; in France, a first-class diligence carries fifteen inside and four out.

The diligence is more roomy, and to that extent less fatiguing, than an English stage-coach; but the rate of travelling rarely exceeds six or seven miles an hour, and in bad weather it falls below that. Formerly they used to have rope-harness, but within the last few years the arrangements have been improved, and strips of hide are now used instead; yet the appointments are still far behind those of the dashing stages which railroads have gone far to extinguish in England. The diligence and its contents are placed in charge of the *conducteur*, who is equivalent to the English "guard," but is a more welcome companion, inasmuch as he does not hold out his hand for fees: he is paid by the owners of the diligence, and is generally an intelligent man, from whom a traveller may pick up many scraps of information. When one of the largest diligences is fully loaded, it weighs nearly eleven thousand pounds, and is drawn by either five or six horses. the postilion or driver used to ride on the saddle, but he now drives from a box. Besides passengers, the diligences carry a great deal of heavy luggage which would in England be conveyed by waggon or canal.

All the places in a diligence are *numbered*, and each passenger takes the seat allotted to him when paying his fare: the corner seats are always preferred, and are allotted to the first comers. Every passenger's name is called over before he enters the diligence, and his place is pointed out to him. The average rate of fares is equal to about a penny a mile, except for the coupé, which is higher; in England, as most travellers know, the fare is very much higher. There are two great Companies at Paris—the Messageries Royales, and the Messageries Générales—to whom belong a very large number of the diligences: they "coach" the roads to a certain distance from Paris, and correspond with other companies or proprietors, who take up the more distant routes. It is said that, "during the month of August, the diligences on all the great roads are thronged with school-boys and collegians, with their parents and masters, in consequence of the breaking up of the establishments of education in Paris, all hurrying home at once into the provinces. It not unfrequently happens that, for a fortnight together, every place is taken. The vacations at the public offices occur about the same time, and contribute largely to swell the crowd of travellers in August."

The stage-coaches (to use a term familiar to English readers) of other European countries partake more or less of the character of the French diligences. In Sardinia and other parts of northern Italy, there are diligences on the principal roads, but they have neither coupé nor banquette, and therefore afford little opportunity for seeing the country. Here again we may trace the nature of the vehicles to the taste of the inhabitants; for the Italians, when travelling on a long journey, shut themselves in from dust, rain, and all other outward visitation. An English writer, expressing English thoughts, says—"Any spirited entrepreneur who could set up a stage-coach to carry outsides, would deserve a statue to his memory."

Travelling in Switzerland has so greatly increased within the last few years, that diligences now run daily between most of the large towns, and there are few carriage-roads in the country not traversed by them two or three times a week. They generally belong to the government of the different cantons, and are attached to the post-office. The places are numbered, and each passenger is allowed a certain weight of luggage. On going from one canton to another, and therefore from one set of proprietors to another, the passengers are often transferred to another coach; and the arrangements have so little of that completeness observable in the English stage coach system, that the travellers have sometimes to wait several hours, in the middle of the night, and in a remote place, before the relay coach is ready. The conducteur's fee is included in the fare; but a *trinkgeld* (drink-money) is sometimes expected by the postilion or driver.

In Austria and the southern parts of Germany, the diligences, under the general name of *eilwagen* (quick-coach), belong to the respective governments, and are managed by government officers. No one can book a place without showing his passport, if about to cross the frontier. The seats are numbered, and appropriated in the order in which they are applied for, the first numbers being affixed to the corner seats, as being the most desirable. A receipt is always given for the fare and the baggage, of which particular care is taken. In Prussia the name *schnellpost* (quick-post) is applied to the diligences. They travel at the rate of about six miles an hour, and are roomy and comfortable vehicles. The rates of fare are from two to threepence per mile, including all fees, in respect to which continental arrangements are very much better than those of England; in some places the conducteur is prohibited from accepting, and in nearly all he is prohibited from asking, that compulsory gift (if we may so term it) which is so annoying in England. If an English stage-coach is full, the expectant traveller is left to fare as he may; but in Prussia and Austria, if more passengers apply than the schnellpost or eilwagen will accommodate, auxiliary vehicles (*beichaisen*) are provided, which carry on the extra passengers at the same rate and for the same fare. Sometimes, when Leipzig fair is going forward, twenty or thirty of these bei-chaisen will travel in company.

The Prussian schnellpost has no outside places, and no difference in fare is made between the front and back seats. At every post-house where the schnellpost stops, there is a room where the passengers can obtain such refreshments as "butter-brod," sandwich, and coffee, at fixed prices, and where a complaint-book is kept.

Holland, Belgium, and Russia have all got their diligences or stage-coaches, resembling more or less those which we have already noticed. In Holland they belong to private individuals or companies licensed by the government: they are roomy and con-

venient, travel at the rate of about six miles an hour, and are usually drawn by three horses yoked abreast. Beichaisen are provided, as in Germany. In Russia the diligences are said to be of rather a superior kind. Dr. Granville says: "On the Riga and Moscow roads, these vehicles are kept in excellent order, and perform their journey with great regularity: on the former road, in three days and three nights (from St. Petersburgh); on the latter, in four days and three nights, stopping only for refreshments. The carriages are of considerable length, and are necessarily heavy, but their progress is not much impeded from that circumstance, and the speed is equal at least to any of the *voitures accelleries* in France. The rate of going is about seven English miles an hour. The diligence to and from Moscow sets off every day carrying four inside, two in the *arrière cabriolet*, and one passenger with the conducteur. The fare is the same for all, viz. seventy-five roubles in the winter, and one hundred and twenty roubles in the summer, when the cabriolet passenger pays only half. The price for the refreshments, taken during the day, is fixed at two and a half roubles."—The rouble is equal to about 3*s.* 3*d.* English, and the lowness of the winter fare is due to the circumstance that the diligence is placed upon a sledge, and travels quicker.

Uniforms of New Orleans.—I remarked how closely those whom I met or passed resembled each other. It is difficult to mistake a Yankee for the inhabitant or native of any other country. They are almost closely shaven—not a vestige of beard or whiskers is left; and then their garments are all so precisely the same, I felt I should never be able to distinguish one man from another. I could not at first comprehend why all the male inhabitants looked so precisely like figures made on the same model; but my lengthened drive through the streets enlightened me. Outside a great many of the "notion" stores I saw just such figures hanging up—coat, pantalon à sous pied, in short, the whole outward man. There was this difference—and be it remarked, it is an essential one—the latter were men of straw. Such cannot be said of the wealthy merchant of New Orleans. The fact is this—there are no working-tailors at New Orleans, and every article of dress comes ready-made from the Northern States. There are merchant-tailors in plenty; and if the traveller in New Orleans is in want of a suit of clothes, he must, if of the masculine sex, betake himself to one of these gentlemen, and he will be forthwith fitted with anything he may happen to want. "*Pants*" are daily announced, as a cargo just arrived "by the ——— from New York:" the latter city evidently has the responsibility of setting the fashions to the elegants of the other cities of the Union. These garments being all of the same colour and fashion, fully accounts for the similarity of the appearance of the inhabitants.—*Mrs. Houston's Texas and New Orleans.*

Irrigation in Egypt.—The land, naturally inundated, is sown only once a year usually, and that is after the subsidence of waters. But the tracts subjected to artificial inundation will annually yield three crops, being first sown at the same period as the districts above mentioned with wheat or barley; a second time, after the vernal equinox, with indigo, cotton, millet, or some similar produce; and again, about the summer solstice, with millet or maize. I was much pleased that during my visit the state of the crops fully accorded with their relative condition in the time of Moses, during the plague of hail, for "the barley was in the ear, and the flax was bolled," when I saw them, and would therefore be smitten; but "the wheat and the rye would not be smitten, for they were not grown up." (Exodus, chap. x. v. 31, 32.) Gratifying too was it to be informed, that the custom referred to Ecclesiastes, "Cast thy bread upon the waters, for thou shalt find it after many days." (Ecclesiastes, chap. xi. v. 1) is now illustrated by the agriculturist casting his seed on the mud before the water has quite subsided; afterwards a little dry mould is usually spread over it by hand. The machine used for irrigation, so frequently erected on the banks of the Nile, must excite curiosity. It is composed of a vertical wheel, round which are fastened two parallel cords, reaching a little below the surface of the stream; to these are attached, at equal distances, earthen pots, which fill successively by dipping into the water as the wheel revolves, discharging their contents, when raised to the highest point, into a trough, from which the fluid is carried by a trench into the intended locality. But in order to set this wheel in motion, a small vertical wheel, with cogs, is fastened to the opposite end of the same axis, it being from six to eight feet in length, and in a horizontal position; with it is a third and larger cogged wheel, which, being turned by oxen or cows, sets the two first in motion. At spots more remote, spacious pits are dug to receive the water, whence it is drawn up by a simple machine formed of two upright posts, with a horizontal bar between them, to which is affixed a lengthy lever, having a vessel at its smaller extremity; this, being filled by lowering and raising the pole, then discharges itself into a trough placed for the purpose.—*Stent's Egypt.*

Bread in Kordofan.—The dokn, having been ground on a stone to flour, is put into an earthen pot, and converted, by means of water, into a thin paste. A fire is now lighted under an earthen dish (or under an iron plate, called dogo'a, which stands on three stones: when the dish is heated, it is greased with butter, and the paste is spread upon it in the shape and size of an ordinary cake. The one side being baked, the bread is turned, and the dish again greased with butter. These cakes are about the thickness of a finger, and for Europeans very indigestible: they distend the stomach, indeed, awfully; an effect produced by the corn, partly because the husks are not separated from the flour, partly because the bread is not well baked. Those who are more wealthy, consume a better kind of bread, which has also a more pleasant flavour; the flour is purified, and the paste more fluid; it is spread upon the dish by means of a small brush, but otherwise prepared in the same manner as the former variety. Much time is required to bake the necessary quantity for the consumption of the house. More than one hour is spent in making bread enough of the latter description to serve two persons at dinner. Fresh bread must, therefore, be prepared every day; and it is always made by the women; for, as there is no mill in Kordofan, every one is obliged to grind the quantity of flour necessary for his consumption daily. This is done, as I have already observed, by female slaves.—*Travels in Kordofan, by Ignatius Pallme.*

Nuisances in Rome.—There are many things in Rome which offend our English feelings, although the natives do not seem to be at all affected by them. Thus, all the spouts send down torrents of water from the eaves of the houses into the streets below, inflicting a deluge on those who have not learned the art of threading their way successively through the spaces which intervene betwixt the descending torrents. Many a time have I received on my shoulders this annoying fall of water. The streets, too, are abominably filthy with offensive matter, causing a nuisance which would not be tolerated for a single day in an English town; and within the entrance door of many of their dwellings there may be seen a pool which loudly calls for a mop, if the purity of ladies' flounces be an object worthy of attention. Again, the kitchens of these Italians appear as though they had never once been whitewashed since the days of Ancient Rome; whilst their cooking utensils are, at times, none of the most cleanly. A friend of mine had ordered an omelet for supper. His servant, on going accidentally into the kitchen, saw the cook preparing it in a kind of thing which I dare not exactly describe. But the reader will understand me when I inform him that the filthy rascal, not having a proper kitchen-pan at hand, had actually been up into the bed-room for a substitute. One English maid, once expressing a wish for a culinary utensil in order to pour some broth into it, the Italian servant had one in her eye which would just suit. She went and brought the brass part in which we regularly washed our feet.—*Waterton's Essays.*

Effects of eating Fish.—Many persons have an idiosyncrasy so peculiar that even cod or salmon will produce an eruption or other temporary disease. It is well ascertained that the oyster, and still more the muscle, at times acquires properties which render it poisonous or hurtful. Vancouver had four sailors taken ill, after eating muscles, of whom one died in five hours and a half. Two fatal cases also from the same cause occurred in the practice of Dr. Combe.—*Ency. Met., art. Medicine.*



[Bath place of Colonel Gardiner, and Tree which]

COLONEL GARDINER.

"I THOUGHT," says the curate, in 'Tristram Shandy,' "that you gentlemen of the army, Mr. Trim, never said your prayers at all," to which the corporal, "piqued for the honour of the army," replies,—"A soldier, an' please your reverence, prays as often (of his own accord) as a parson; and when he is fighting for his king, and for his own life, and for his honour too, he has the most reason to pray to God of any one in the whole world: but when a soldier, an' please your reverence, has been standing for twelve hours together in the trenches, up to his knees in cold water; or engaged for months together in long and dangerous marches; harassed, perhaps, in his rear to-day; harassing others to-morrow; detached here; countermanded there; resting this night out upon his arms; beat up in his shirt the next; benumbed in his joints: perhaps without straw in his tent to kneel on—he must say his prayers how and when he can." At the period when Sterne wrote his celebrated work it was assumed, almost as a matter of course, that every military man was a profligate. The moral tone of society generally was in a low state, or such an estimate could scarcely have been correct as to any influential portion of it. It was in the state of things above mentioned that a man distinguished for his military services became still more eminent for his fervent piety, though by profession a soldier. We allude to Colonel Gardiner.

The principal circumstance in the life of Colonel James Gardiner was his religious conversion, which rendered him conspicuous at a time when the absence of dissoluteness and a very slight regard to the decencies of virtuous life were held to be no inconsiderable praise in military men. He was a brave gallant man: but we shall pass over the details of his military life, except its closing scene and one remarkable circumstance which occurred to him at the battle of Ramillies in 1706. Colonel Gardiner was born at Carriden, Linlithgowshire, in 1688. We give a view of the house in which he was born, which lies in a sequestered spot between Blackness Castle and Borrowstoness, and commands a charming view of the Frith of Forth. His father, who had a handsome estate, was a captain in the army, and died abroad in consequence of the fatigues which he had experienced during the campaign. His son James entered the army at a very early age, and when at the age of fourteen, he obtained an ensign's commission in a Scotch regiment, in the Dutch service he had already served some time as a cadet. In 1702 he received an ensign's commission from Queen Anne. At the battle of Ramillies he was one of the "forlorn hope" which was sent to dispossess the French of the church-yard. He had gallantly planted his colours and was encouraging his men, when he received a shot in his mouth, "which," says his biographer Dr Doddridge, "without beating out any of his teeth, or touching the fore part of his tongue, went through his neck and came out about an inch and a half on the left side of the vertebræ. Not feeling at first the pain of the stroke, he wondered what was become of the ball, and in the wildness of his surprise began to suspect he had swallowed it, but dropping soon after, he traced the passage of it by his finger."

The above singular escape seems to have had no influence on his conduct, which continued dissolute and licentious until July, 1719, when the following circumstance occurred to him: He had retired to his chamber about eleven o'clock at night, and, to "kill time" for an hour, took a religious book in which the military profession was spiritualized, expecting, as his biographer states, to find in the work phrases which might afford him some diversion when "he thought he saw an unusual blaze of light fall on the book while he was reading, which he at first imagined might happen by some accident to the candle. But lifting up his eyes, he apprehended, to his extreme amazement, that there was before him, as it were suspended in the air, a visible representation of the Lord Jesus Christ upon the cross, surrounded on all sides with a glory; and was impressed as if a voice, or something equivalent to a voice, had come to him to this effect (for he was not confident as to the very words), 'Oh, sinner! did I suffer this for thee, and are these the returns?' This circumstance changed the whole character of his future life.

Colonel Gardiner's vision has often been alluded to in proof of the existence of supernatural agencies. Doddridge, however, remarks on "the possibility that while he was sitting and reading in this careless and profane manner, he might suddenly fall asleep and only dream of what he apprehended he saw;" but the Colonel always insisted that he was broad awake during the whole time, and several times in conversation with Doddridge spoke of the appearance which he had seen, as what had undoubtedly passed before his eyes,

and not in imagination. As to the voice which he heard, he did not seem confident whether it were an audible voice or only a strong impression; but Doddridge states that the Colonel inclined to believe in the reality of the voice, as well as in the vision. Dr. Hibbert, in his ingenious work on the 'Philosophy of Apparitions,' in allusion to this circumstance in Colonel Gardiner's life, remarks:—"With regard to this vision, the appearance of our Saviour on the cross, and the awful words repeated, can be considered in no other light than as so many recollected images of the mind, which, probably, had their origin in the language of some urgent appeal to repentance that the colonel might have casually read or heard delivered. From what cause, however, such ideas were rendered as vivid as actual impressions, we have no information to be depended upon. This vision was certainly attended with one of the most important of consequences connected with the Christian dispensation—the conversion of a sinner. And hence no single narrative has, perhaps, done more to confirm the superstitious opinion that apparitions of this awful kind cannot arise without a divine fiat." Dr. Hibbert adds in a note—"A short time before the vision, Colonel Gardiner had received a severe fall from his horse. Did the brain receive some slight degree of injury from the accident, so as to predispose him to this spiritual illusion?"

The "conversion" which this vision effected was most complete, and for the remaining twenty-six years of his life, Colonel Gardiner's religious zeal, his piety, his disregard of all save the idea of realizing in every thought and action his convictions of Christian duty, exercised over his mind an influence which was ever predominant and active. In his day, a man who was really anxious in spiritual matters had difficulties to encounter in social intercourse of a very different kind to those which would be experienced in the present day, as the following anecdote from Doddridge will show:—Colonel Gardiner had invited the commanding officer of the king's forces then about Edinburgh, with the other colonels, and several officers of various ranks, to dinner at his house at Bankton. "He too well foresaw (says Doddridge) what might happen amidst such a variety of tempers and characters, and fearing lest his conscience might have been ensnared by a sinful silence, or that, on the other hand, he might seem to pass the bounds of decency and infringe upon the laws of hospitality by animadverting on guests so justly entitled to his regard, he happily determined on the following method of avoiding each of these difficulties. As soon as they were come together, he addressed them with a great deal of respect, and yet at the same time with a very frank and determined air, and told them that he had the honour in that district to be a justice of the peace, and consequently that he was sworn to put the laws in execution, and among the rest those against swearing; and that therefore he entreated all the gentlemen who then honoured him with their company, that they would please to be upon their guard, and that if any oath or curse should escape them, he hoped they would consider his legal animadversions upon it as a regard to the duties of his office and the dictates of his conscience, and not as owing to any want of deference to them." The commanding officer immediately supported him in the matter, saying that he would be ready to pay the penalty if he inadvertently transgressed, and when Colonel Gardiner on any occasion stepped out of the room, he himself promised to take notice of any infringement of the law, and accordingly caused one of the officers who had offended to be fined. This is a curious picture of manners a century ago, when swearing was common amongst all classes of even well educated persons.

We hurry on to the close of this good man's life. The battle of Preston-Pans, on the 21st of September, 1745, between the troops of Charles Edward, the young Pretender, and the English troops under General Sir John Cope, is not a little memorable on several accounts. Victory declared in favour of the Stewart cause at the very outset of this wild campaign, and the "Hanoverian" government, as the Jacobins called it, were proportionately dismayed. The event threw London into a panic. English dragoons, perplexed with the novel manner of fighting of the Highlanders, turned their backs on the enemy and fled. Colonel Gardiner was killed in attempting to rally them; and lastly there is the famous ballad beginning "Hey, Johnny Cope, are ye wauking yet," which commemorates the part which that hero played in the events of the day, which began by his being fetched from his comfortable quarters where he had spent the eve of battle, instead of resting on the field, and ended with his posting away to announce the news of his own defeat. The last hours of Colonel Gardiner's life are described by his biographer. He continued all the night under arms, wrapped up in his cloak, and generally sheltered under a rick of barley which happened to be in the field. The rebels commenced their attack before sunrise, but when it was sufficiently light to discern what was going on, at least so far as the fog permitted. Sir Walter Scott's description, in 'Waverley,' of the short but rapid onslaught of the Highlanders is well known. Dr. Doddridge says: "Colonel Gardiner, at the beginning of the onset, which in the whole lasted but a few minutes, received a wound by a bullet in his left breast, which made him give a sudden spring in his saddle, upon which his servant, who had led the horse, would have persuaded him to retreat, but he said it was only a wound in the flesh; and fought on, though he presently after received a shot in his right thigh. In the meantime it was discerned that some of the enemies fell by him, and particularly one man who had made him a treacherous visit but a few days before with great professions of zeal for the present establishment. Events of this kind pass in less time than the description of them can be read. The Colonel was, for a few moments supported by his men, and particularly by that worthy person Lieutenant-Colonel Whitney, who was shot through the arm here, and a few months after fell nobly in the battle of Falkirk, and by Lieutenant West, a man of distinguished bravery, as also by about fifteen dragoons, who stood by him to the last. But after a faint fire, the regiment in general was seized with a panic; and though the Colonel and some other gallant officers did what they could to rally them once or twice, they at last took a precipitate flight." At this moment Colonel Gardiner saw a party of foot bravely fighting near him without any officer to head them, on which he said, "Those brave fellows will be cut to pieces for want of a commander," or words to that effect, and, riding up to them at the same time, he cried out, "Fire on, my lads, and fear nothing," which words he had scarcely uttered, says Doddridge, before "a Highlander advanced towards him with a scythe fastened to a long pole, with which he gave him such a deep wound on his right arm that his sword dropped out of his hand." Several others coming about him, he was dragged from his horse, and the moment he fell, another Highlander gave him a mortal stroke either with a broadsword or Lochaber-axe at the back of his head. His hat had fallen, but he took it in his left hand, and waved it as a signal to a faithful attendant to retreat. This servant left the field, and, having disguised himself as a miller's servant, returned in two hours after the engagement, and found his master plundered of his watch and valuables, and also stripped of his under garments and

boots, but he was still breathing. He was conveyed to the church of Tranent, and immediately after into the minister's house, where he breathed his last about eleven in the forenoon. Doddridge observes, "I thank God that I am not called to apologize for his following his troops in their flight, which, dear as he was to me, would have grieved me much more than his death with these heroic circumstances attending it."

The Western Antiquities.— In the valley of the Mississippi, and the more southern parts of North America, are found antique curiosities and works of art, bearing the impress of cultivated intelligence. But of the race, or people, who executed them, time has left no vestige of their existence, save these monuments of their skill and knowledge. Not even a tradition whispers its *sea-work*, who they might be. We only know *they were*. hat proof and evidence do we gather from their remains, uch have withstood the test of time, of their origin and proba- era of their existence? That they existed centuries ago, is dent from the size which forest trees have attained, which grow upon the mounds and fortifications discovered. That they were civilized, and understood the arts, is apparent from the manner of laying out and erecting their fortifications, and from various utensils of gold, copper, and iron which have occasionally been found in digging below the earth's surface. If I mistake not, I believe even glass has been found, which, if so, shows them acquainted with chemical discoveries, which are supposed to have been unknown until a period much later than the probable time of their existence. That they were not the ancestors of the race which inhabited this country at the time of its discovery by Columbus, appears conclusive from the total ignorance of the Indian tribes of all knowledge of arts and civilization, and the non-existence of any tradition of their once proud sway. That they were a mighty people is evident from the extent of territory where these antiquities are scattered. The banks of the Ohio and Mississippi tell they once lived; and even to the shore where the vast Pacific heaves its waves, there are traces of their existence. Who were they? In what period of time did they exist? In a cave in one of the Western States, there is carved upon the walls a group of people, apparently in the act of devotion: and a rising sun is sculptured above them. From this we should infer that they were Pagans, worshipping the sun and the fabulous gods. But what most strongly arrests the antiquarian's observation, and causes him to repeat the inquiry, "who were they?" is the habiliments of the group. One part of their habit is of the Grecian costume, and the remainder is of the Phœnicians. Were they a colony from Greece? Did they come from that land in the days of its proud glory, bringing with them a knowledge of arts, science, and philosophy? Did they, too, seek a home across the western waters, because they loved liberty in a strange land better than they loved slavery at home? Or what may be as probable, were they the descendants of some band who managed to escape the destruction of ill-fated Troy? —the descendants of a people who had called Greece a mother-country, but were sacrificed to her vindictive ire, because they were prouder to be Trojans than the descendants of Grecians? Ay, who were they? Might not America have had its Hector, its Paris, and Helen? its maidens who prayed, and its sons who fought? All this might have been. But their historians and their poets alike have perished. They *have been*; but the history of their existence, their origin, and their destruction, all are hidden by the dark chaos of oblivion. Imagination alone, from inanimate land-marks, voiceless walls, and soundless bodies, must weave the record which shall tell of their lives, their aims, origin, and final extinction. Recently, report says, in Mexico there have been discovered several mummies, embalmed after the manner of the ancient Egyptians. If true, it carries the origin of this fated people still further back; and we might claim them to be contemporaries with Moses and Joshua. Still, if I form my conclusions correctly from what descriptions I have perused of these Western relics of the past, I should decide that they corresponded better with the ancient Grecians, Phœnicians, or Trojans, than with the Egyptians. I repeat, I may be incorrect in my premises and deductions; but as imagination is their historian, it pleases me better to fill a world with heroes and beauties of Homer's delineations, than with those of "Pharaoh and his host."—*Mind among the Spindles. Knight's Weekly Volume.*

Giraffe-hunting.—As soon as the dry season commences, the giraffes return to the neighbourhood of Kordofan: they are not gregarious in their habits, like the antelopes, and they are only to be seen separately, or at the most in pairs. These beautiful creatures are caught by men on horseback, but merely the young animals are taken alive, as it would almost amount to an impossibility to catch an old beast, who would overthrow both horse and rider, and use them very roughly. The latter are therefore slain with a sword, merely for the sake of their skins, which form an article of trade. The flesh is eaten, and has not a disagreeable flavour. In order to be allowed to hunt giraffes for a menagerie, it is necessary first to obtain a firman from the minister of the interior, and it is the best plan to apply at once to the Sheikh Abdel Had at Haraza; he will immediately give an order to his people who occupy themselves with this sport, for it requires not only a very expert horseman, but a very perfect horse, and more especially experience in this species of hunting. Generally speaking, two horsemen, provided with one or two camels laden with a supply of provender and water sufficient for a few days, proceed into the desert frequented by the giraffes. The camels are left at an appropriate place, whilst the riders reconnoitre the country until they come upon the track of an animal. Great experience is now requisite to distinguish whether the trace is of to day or yesterday, or of a yet older date. If it be recent, and that of a young animal, it is immediately followed up, and the huntsman may make sure of gaining a sight of their prey in a few hours. As soon as the giraffe is in view, the run instantly takes place, for the animal, very timid by nature, seeks refuge in flight, and indeed with extraordinary fleetness. Everything now depends on the dexterity of the rider and activity of his horse. They must do all in their power to gain upon the game they have started, an endeavour which is the more readily to be effected, as the giraffe never takes a straight course, but, by nature timid, doubles in fear of its life, sometimes to the right, and sometimes to the left, and is thus quickly overtaken by the horsemen. Having come up with the young animal pursued, the rider casts a lasso over its head; his throw but seldom fails, and in the worst case must be repeated. He then attaches the end of the rope to his saddle, drags the animal as closely as he can to his horse, and thus the capture is effected. But now a steady and patient horse, well broken into its work, is again necessary for the further transport; for the horse must resist the animal's efforts, or give way to them (for it pulls and jumps in all directions), in conveying it to the nearest village, which the huntsmen endeavour to reach as quickly as they can. A she-camel should stand in readiness there to give the young giraffe milk, with which it is fed before being weaned to grass or hay. This treatment must be subsequently followed, and even full-grown giraffes should receive milk daily as drink, if it be in any way possible. When the young animal has rested for some time, it is further led without delay to Dongola, but on this occasion great attention is again required. A kind of head-stall is put on the animal's head, to which four stout cords are fastened. Two men each holding the end of one of the ropes in his hand, walk in front, and two follow to keep its gait steady, a task requiring during the first few days extraordinary exertion. A she-camel must accompany the young giraffe to give it the necessary nourishment on the road. Arrived at Dongola, a certain time is again devoted to rest, and the animal is here accustomed to the milk of the cow and to grass. It is incredible what difficulties the Arabs have to contend with in preserving a giraffe alive, and it is, consequently, not to be wondered at that their price is so enormous. In Egypt, for example, at Cairo or Alexandria, a living specimen always costs from five to six hundred dollars.—*Travels of Ignatius Pallme.*

Economy of Power in Natural Productions.—There are a thousand objects, such as quills, reeds, the grasses, &c., which show that strength is uniformly given by nature, with the least possible expense of material. It was this fact to which Galileo appealed, when he was arraigned before the Inquisition on the charge of atheism. If, said he, there were nothing else in nature to teach me the existence of a Deity, even this straw would be sufficient. Such a straw, if made solid, and yet of the same quantity of material, would be so thin, that it would bend and break under the slightest weight; whereas, in its present form it is able to support an ear, which is heavier than the whole stalk. —*Dr. Potter.*



[Portrait of Volterra, and Group from his picture of the Taking Down from the Cross.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXX.

THE SCHOLARS OF MICHAEL ANGELO.

It must be borne in recollection that the pictures ascribed to Michael Angelo in catalogues and picture galleries are in every instance copies made by his scholars from his designs and models. Only one easel picture is acknowledged as the genuine production of his hand. It is a Holy Family in the Florentine gallery, which as a composition is very exaggerated and ungraceful, and in colour hard and violent; it is painted in distemper, varnished; not in oil, as some have supposed.

Marcello Venusti was continually employed in executing small pictures from celebrated cartoons of Michael Angelo; and the diminutive size, and soft, neat, delicate execution, form a singular contrast with the sublimity of the composition and the grand massive drawing of the figures. One of these subjects is the Virgin seated at the foot of the Cross, holding on her lap the dead Redeemer, whose arms are supported by two angels. The finest example of this composition is in the Queen's Gallery at Buckingham Palace, and the finest engraving that by Bonasoni. Also of the Christ on the Cross, with the Virgin and St. John standing, and two angels looking out of the sky behind with an expression of intense anguish; one of these, a very fine example, was lately sold in the Lucca gallery. Another is 'Il Silenzio,' *The Silence:* the Virgin is represented with the dead Christ lying across her knee, with his arm hanging down. She has a book in one hand: behind her on one side is the young St. John in the panther's skin, with his finger on lips; on the other, St. Joseph. The Annunciation, in which the figure of the Virgin is particularly majestic, is another famous composition. Copies of these subjects, with trifling variations, are to be found in many galleries, and the engravings of all are in the British Museum.

Sebastiano del Piombo was another artist who painted under the direction and from the cartoons of Michael Angelo: the most famous example of this union of talent is the Raising of Lazarus, in our National Gallery. "Sebastian," says Lanzi, "was without the gift of invention, and in compositions of many figures slow and irresolute." But he was a consummate portrait painter and a most admirable colourist. A Venetian by birth, he had learned the art of colouring under Giorgione. On coming to Rome in 1518, he formed a close intimacy with Michael Angelo: the tradition is, that Michael Angelo associated Sebastiano with himself, and gave him the cartoons of his grand designs—to which the Venetian was to lend the magical hues of his pallette—for the purpose of crushing Raphael. If this be true, the failure was signal and deserved; but luckily we are not *obliged* to believe it.

The illustration is the figure of Lazarus in this picture, undoubtedly designed by the hand of Michael Angelo.

Giacopo Pontormo painted the Venus and Cupid now at Hampton Court, from a famous cartoon of

Michael Angelo; and also a Leda, which is in the National Gallery, and of which the cartoon, by Michael Angelo, is in our Royal Academy.

But the most celebrated and the most independent among the scholars and imitators of Michael Angelo was Daniel da Volterra, whose most famous work is the Taking down the Saviour from the Cross, with a number of figures full of energy and movement. The group of the Virgin fainting, in our illustration, is taken from this picture.

Giorgio Vasari was a pupil and especial favourite of Michael Angelo. He was a painter and architect, but of second-rate merit: he has, however, earned himself an immortality by his admirable biography of the painters, sculptors, and architects of Italy, from the earliest times to the death of Michael Angelo, whom he survived only ten years. A large picture by Vasari, representing the six great poets of Italy, is in the gallery of Mr. Hope.

It is not necessary to say anything here of the painters who, in the middle of the sixteenth century, and in the lifetime of Michael Angelo, imitated his manner: they were mere journeymen, and, indeed, imitated him most abominably; mistaking extravagance for sublimity, exaggeration for grandeur, and distortion and affectation for energy and passion:—a wretched set! But before we leave Florence, we must speak of one more painter, whose proper place is here, because he was a Florentine, and because he combined in a singular manner the characteristics of the three great men of whom we have last spoken—Lionardo da Vinci, Fra Bartolomeo, and Michael Angelo, without exactly imitating any one of them. This was Andrea del Sarto, a great artist; but who would have been a far greater artist had he been a better man.



[Group from the Raising of Lazarus, by Sebastian del Piombo.]

VEHICLES AND TRAVELLING ON THE CONTINENT.—No. II.

POST-TRAVELLING.—In all European countries, with a few exceptions, a system of travelling is adopted which presents a pretty close analogy to our travelling by post. This differs from the diligence or stage-coach system in two respects—that the traveller engages the whole vehicle, and that it goes in any direction and to any distance that he may determine; the rate of payment being in most cases at so much per mile.

In France there is a book published by authority of the government, called the 'Livre de Poste,' or Post-book, which contains all the regulations for post-travelling, most of which are very exact and stringent. Previous to 1840, the distances on post-roads were reckoned by "postes," but now they are reckoned by "kilomètres," of which eight are about equal to five English miles, or one equals five furlongs. In England "posting" means the hire of a post-chaise as well as the horses; but in France the post-masters have very few chaises, and merely lend horses to those who drive their own carriages, or carriages hired in some other way. For all the larger kinds of carriages, berlins, landaus, and barouches, the 'Livre de Poste' allots four horses; for chariots and other carriages of lesser weight than the former, three horses; for cabriolets and calèches, two horses; but the travellers are allowed to deviate slightly from these strict arrangements. The charge is one-fifth of a franc per kilomètre for each horse, about three pence per mile, with a fee of about three halfpence per mile to the postilion. The rate of travelling is not much above six or seven miles an hour; but English travellers, by increasing the postilion's fee beyond what the law recognises, are said generally to exceed this rate of speed. The manner in which the postilion shall harness the horses one before or by the side of another, the arrangements for changing horses at the post-stations, and various minor details, are all specified in the 'Livre de Poste.' It is one of the numerous points in which France effects by government control that which is in England carried out by private enterprise. Those who travel post in France, and do not take their own carriages, generally hire, from the innkeepers in large towns, carriages at a certain rate per journey or per week, according to private agreement. In Italy the posting is of different character in different states. In Piedmont there is issued a *bolletone*, or ticket; which is inscribed with the route taken by the traveller, the length of the posts, and the posting regulations; but in some other of the states, where these regulations are wanting, the traveller is likely to be imposed upon. In the Papal States the posting belongs to the government, who lets it out by contract; the licensing of the post-masters, the charges for posting, the fees to postilions, &c. being regulated by the government. A book of regulations is issued, containing the most minute instructions:—the number of horses for a carriage with one seat, for others with two or more seats, the number of persons to each carriage, the number of horses and postilions to be kept by each post-master, the minimum time for which the vehicle can be hired, the postage charge, the fee to the postilion, all are minutely regulated. The expense for hiring a pair-horse carriage, with the necessary attendance, is about eighteen pauls for a Roman post, equal to about a shilling an English mile. For an extra paul, or five pence, the traveller may have a *bolletta di viaggio*, or travelling ticket, containing the agreement between him and the post-master, to prevent misunderstandings; and he is afforded an opportunity of stating in writing whether he has been ill or well served by the postilion, who is kept in check thereby.

In Switzerland the system of posting has not yet been carried out to any great extent. In Germany it is extensively adopted, but in a very inferior style to that observable in England. The post-masters provide open calèches or chaises, but they seem to be poor vehicles. The postilion's fee is not limited in most

parts of Germany; he may receive as much as the travellers choose to give him, which is generally about three pence per English mile. If two post-chaises meet in the middle of a stage, the postilions frequently change horses, and each one returns to the post-town whence he had come. When travellers by post wish to get on with great speed, they obtain an order called a *laufzettel* (speed-ticket); this is a written document containing the hour of departure, the route to be taken, and the number of horses required; and the post-master sends orders onward to all the post-houses, ordering relays of horses to be ready at each house at a particular time, by which very considerable time is saved in changing horses. The laufzettel must be applied for twelve hours before the time of starting, and a small charge is made for it.

In Prussia the posting is excellently arranged, under the strict surveillance of the government. The post-masters are often retired officers, and always respectable men. Each horse hired is charged at the rate of about a shilling per German mile (4½ English miles). In Russia the posting is, as may be supposed, under the control of the government; and the payment comprises a fee to one of the government officers, as well as a payment to the postmaster. The total payments and fees for four horses amount to scarcely more than sixpence per English mile. At the post-houses, besides chariots, berlins, britschkas, and calèches, there are vehicles kept for hire called kibitkas. These are low four-wheeled carriages, having an open or closed railing all round, and sometimes (but not always) springs. In no other part of Europe is there customarily attached so many horses to a carriage as in Russia. Three horses abreast is a very common arrangement; and sometimes there are as many as eight, in two rows of four each, all eight occasionally managed by one driver.

Voiturier; Vetturino; Lohnkutscher.—As the posting-system differs from the diligence-system, so does that which we shall now touch upon differ from both. The voiturier of France, as well as the vetturino of Italy and the lohnkutscher of Germany, is one who has a vehicle for hire, which he will drive in any direction, at any time, for any period, and at the best bargain that he can make, without the strict surveillance to which the post-system is subjected. The carriages usually appropriated to this purpose in France are a kind of cabriolet of a heavy and jolting construction. The charge for the hire is about eight or nine francs per day, exclusive of a small fee to the driver.

In the vetturino-system of Italy, by which a vehicle is hired under the above arrangement, there are three modes of carrying it out. In the first the traveller hires a seat in a carriage jointly with other persons; in this case his fellow-travellers are generally natives of the country; and he is liable to many disagreeables unless he is resolved to make the best of everything. In the second mode, a party of persons hire the whole vehicle for themselves, and sometimes contract with the vetturino to supply them also with provisions during the journey, at a rate of payment previously agreed on. The third mode is where two persons hire a *calesse*, or small light carriage, for short distances, and for a day or two only at a time. The driver expects a present above the amount of his fare; and he not unfrequently adds to his profits by inducing the travellers to stop at certain inns in whose welfare he has (secretly) an interest. In the mid-land states of Italy the vetturino generally provides, on a journey of several days, breakfast, dinner, supper, and bed, for the travellers; and it is usual to sign a contract, witnessed by some respectable person, specifying the distance to be travelled, the rate of travelling, the places of stoppage, and the amount of charge.

In all the principal towns of Germany the same system is in operation, but under some modification. The *Lohnkutscher* (somewhat equivalent to coach-lenders, or hack-coach drivers) are usually to be met with in the principal streets, in front of the great inns, where their carriages are stationed, and where they accost passers by with "Suchen sie gelegenheit, mein Herr?"—a somewhat untranslatable question, but implying, "Want a coach, Sir?" They are ready to take any travellers in any direction; and the advantages seem to be these—that if a party of three or four join in the hire, it is cheaper, not only than posting, but also than diligence; that it is more independent than the diligence, in so far as it allows the traveller to stop where and for as long a time as he may choose; that as there are but few roads in Germany where the schnellposts and eilwägen go every day, the lohnkutsch affords an acceptable resource; that it is almost the only available mode of travelling in many of the imperfect cross-roads; and that it allows the traveller an opportunity of resting at night.

The usual lohnkutsch is a light sort of calèche or chaise, capable of being shut in with leathern curtains or glass windows, and of accommodating four or five persons. The usual cost per day for an entire calèche, drawn by two horses, is about six or seven dollars in the north of Germany, including every charge for horse-keep, driver's wages and board, tolls, barriers, ferries, &c.; but there is generally a "trinkgeld" of a few pence per day given to the driver. The German lohnkutscher, unlike the Italian vetturino, does not provide the travellers with meals; he only stipulates that he should be allowed to stop at inns of his own choosing. He generally regulates his daily journey so as to make his mid-day halt at some place where there is a good dinner just ready to be served up.

This mode of travelling has its inconveniences, however. On a long journey, the traveller has generally to start by break of day, in all weathers, and at a pace seldom exceeding a good ordinary walk; at mid-day to rest two or three hours, possibly at a place of not the slightest interest; and to go to bed at sunset, in order to be up betimes in the morning. Sometimes a traveller hires a single place; and sometimes, to secure as much comfort as he can, he takes the whole vehicle, or more than one seat in it, stipulating the exact number of strangers to be admitted. In this latter case, the lohnkutscher not unfrequently breaks his agreement, and puts in as many passengers as the vehicle will contain. One traveller relates the following, as an exemplification of this:—"Being at Heidelberg, and anxious to go to Carlsruhe, he stipulated that, for a certain sum, the kutscher should not take more than three persons (including the writer) in the inside of the calèche; and, ignorant of the custom of the place, paid in advance a portion of his fare to the master or proprietor. The next morning at five o'clock the kutscher, whom he had not before seen, took him up at his inn, put four other persons into the carriage before he left the town, and not only pretended ignorance of the writer's arrangements, but even of any money being paid. When the fourth and fifth persons attempted to get in, the writer of course strenuously resisted; and what was the result? As he only spoke French, and the kutscher German, they did not understand each other. The parties objected to were offended at what they considered a rude interference; and the writer commenced his journey by rendering himself disagreeable and by being sneered at by all for his simplicity and weakness; added to this, the sum which he paid was nearly three-fifths of the whole amount."

There is in Austria an arrangement comprising some of the features of posting, of the eilwagen, and

of the lohnkutsch, but not exactly corresponding with either. Upon all the principal post-roads on which an eilwagen travels, a party amounting to four persons, or agreeing to pay the fare of four, may engage an eilwagen to themselves, even on days when the regular eilwagen does not go at all. It is dearer than the usual eilwagen travelling, but cheaper than posting, and almost equally advantageous; for the traveller can start at any hour he pleases, and may stop to sleep at an inn at night if he pleases. Such a conveyance as this is called a *separat-eilwagen*.

The vetturino-system is carried on in Russia by men called yamtschicks, who supply horses and vehicles at a very cheap rate, and travel rapidly.

THE DRIED FRUITS OF THE LEVANT.

However different the dried currants of the shops may appear from raisins, yet they are all alike produced from grapes; and indeed they *are* grapes in a dried and shrivelled form.

The very small species of grape from which dried currants result are grown only in Greece and the Ionian Islands: all attempts to encourage the growth elsewhere seeming to have failed. They are cultivated chiefly in the islands of Zante, Cephalonia, and Ithaca; but the other Ionian Islands also produce them, and so likewise do the neighbouring shores of the Morea. The account which Mr. M'Culloch gives of the fruit and its culture is nearly as follows. The vine is of a small size and delicate nature, requiring much care in the cultivation. Six or seven years elapse after a plantation has been made, before it yields a crop. In the beginning of October, the earth about the roots of the plant is loosened, and gathered up in small heaps, away from the vine, which is pruned in March; after which the ground is again laid down smooth around the plant, which grows low and is supported by sticks. The crops are liable to injury in spring, from the blight called the "brina," and rainy weather at the harvest season produces great mischief. The currants are gathered towards September, and after being carefully picked, are thrown singly upon a stone floor, exposed to the sun in the open air. The drying process may occupy a fortnight, or longer, if the weather be not favourable. A heavy shower or thunder-storm (no unfrequent occurrence at that season in the Ionian Islands) not only interrupts it, but sometimes causes fermentations; in which case the fruit is fit only to be given to animals. Should it escape these risks, it is deposited in magazines called "scraglie," until sold. The "scragliento" or warehouse-keeper delivers to the depositor a paper acknowledging the receipt of the quantity delivered, which paper passes currently in exchange from hand to hand till the time of export.

Although the Ionian Islands are the chief source at present from whence this fruit is obtained, yet the northern part of the Morea was the birth-place of the produce, so far as is at present known. The name of "currant" is derived from Corinth; and in several other languages of Europe, the name by which this fruit is known is evidently derived from the same source;—thus, in French they are "raisins de Corinthe;" in Italian, "uve passe di Corinto;" in Spanish, "pasas de Corinto;" in German, "Korinthen;" and in Russian, "Kurinka." In the Morea, generally speaking, the growth of this fruit is confined to a strip along the sea-shore, extending but little way inland. When the fruit has been transplanted to other countries than Greece or the neighbouring islands, the result has been remarkable; for even under the same latitude, and with an equal amount of sunshine, success has been unattainable. In Sicily and Malta the currant-grapes degenerated into the common grapes; while in Spain they would not even take root at all; and even attempts which have recently been made to grow them in other parts of Greece, such as in Attica and Argos, have failed.

The history of this trade has, like most others, suffered many fluctuations; but the wars attendant on the Greek revolution twenty years ago injured it more than anything else. Wheler, who travelled in Greece about the end of the seventeenth century, described the trade as being then considerable. Of the fruit itself he said that "they grow not upon bushes, like our red and white currants, as is vulgarly thought, but upon vines, like other grapes; only their leaf is something bigger, and the grape much smaller than others. They are also without stones; and in those parts are only red, or rather black." From this description it would seem that until his time the popular opinion was that this fruit consisted of dried currants, and not dried grapes; and indeed it may be doubted whether three-fourths of those who eat the fruit at the present day in England are not of the same opinion, for both the name and the size are likely to lead to this conclusion.

When the Ionian Islands were under the Venetian government, the liberty of traffic in this produce was very much restricted. In Zante, five persons chosen out of the Council of Nobles, assembled in presence of the proveditore, regulated what should be the price, and those who wished to purchase were under the necessity of declaring to the government the quantity they desired. This system was called the "collegetto." The export duties consisted of an original duty of 9 per cent. ad valorem; afterwards increased by a "dazio fisso," a fixed duty of about four shillings and four-pence the hundred weight; and subsequently further increased by a "novissimo," or duty of two shillings and two-pence the hundred weight. This last-mentioned duty was remitted in favour of vessels bringing salt fish, &c. from the northern ports (chiefly English, Danish, and Dutch); and afterwards in favour of Russian vessels from Odessa; and ultimately was removed altogether as being too heavy. The proveditore had two per cent. for himself; and each of his two Venetian councillors one per cent; so that the result of all these duties was to render the export price of the currants just about double what the cultivator received. During the Greek revolution the trade in currants from the Morea was almost annihilated; but after the final expulsion of the Turks from Greece, and the guarantee of its future independence by the other European powers, the Greeks began again to turn their attention to the cultivation of the currant: the few remaining old plantations, which had nearly grown wild from long neglect, were carefully manured and pruned, and fresh currant vines planted, which by the year 1832 produced nearly four million pounds; and since that period the production has more than doubled itself. In the Ionian Islands the quantity grown has within the last few years frequently amounted to twenty million pounds per annum, of which nine-tenths were exported.

Other kinds of dried fruit, produced in and exported from the countries surrounding the eastern end of the Mediterranean, are raisins and figs. The raisins, as at Malaga and Valencia, in Spain, are simply a particular kind of grape, dried and packed for market; but each district has its own particular variety of grape, from which results that the raisins themselves are peculiar in quality, for the one depends upon the other. In a communication made by an English merchant resident at Smyrna, and published by Mr. M'Culloch, the Smyrna trade in these two commodities is thus spoken of:—"This (fruit) is an article which occupies the attention of all Smyrna more or less, and produces,

during the season, great interest and activity. Figs come to market early in September, and raisins are ready for shipping early in October; the former are procurable only at Smyrna, where the latter, in all their qualities, may be procured; but the shipments are generally made at Cesmé, Vouria, Carabourna, Usbeek, &c., from which ports the name of the raisin takes its origin. Large sums are frequently gained in fruit speculations; and when the demand in England is brisk, and the prices and quality fair with us, it very seldom happens indeed that any loss is sustained. It is, however, attended with risk; it (the fruit) must be shipped dry, and ought only to go in a very fast sound vessel; as much depends upon a first, or, at least, an early arrival, which obtains, in general, a higher price than the later arrivals."

The best raisins of this district are distinguishable from others by their largeness and figure; they are flat, and wrinkled on the surface; soft and juicy within; nearly an inch in length, and semipellucid when held up against a good light. The common way of preparing the grapes for raisins is to tie two or three bunches of them firmly together while yet on the vine, and dip them into a hot lixivium of wood ashes, with a little olive-oil in it; this disposes them to shrink and wrinkle, and perhaps makes small cracks or fissures in the skin: after this they are left on the vine three or four days, separated on sticks in an horizontal situation; and lastly, after being cut from the tree, they are dried in the sun at leisure. A kind somewhat better in quality are dried in ovens; while the finest of all are dried by the heat of the sun only, retaining all their beauty of flavour without contamination by the artificial heat of the oven or the chemical action of the ley.

When Mr. M'Farlane was at this part of Asiatic Turkey a few years ago, he happened to pass through the shipping ports when the raisin-season was at its height. In his narrative ('Constantinople in 1828') he says:—"At Chesmé (the same town spelled Cesmé by the writer before quoted) I found all the world engaged with raisins! There was scarcely room to land on the little quay, for the casks of fruit lying there for embarkation; the narrow streets were thronged with hamals, camels, mules, and asses, all carrying raisins; vast heaps of raisins were seen piled up in every magazine, and in the lower part of the wooden house where I was accommodated by the kindness of my friend Mr. W., were regiments of casks and barrels, mountains of raisins, and about a hundred half-naked, bawling fellows (Turks, Greeks, and Jews,) picking and packing raisins. If at Smyrna I had found every man's mind absorbed in sweetmeat, here it was worse. Chesmé has no other trade but these exports of raisins: the Franks go down there merely to ship the fruit; this they must do with the greatest expedition for the interest of the shippers. Their stay at Chesmé is considered as a sort of campaign to be occupied solely with raisins, to be broken in upon by no other earthly or heavenly subject, and to be got over as quickly as possible; and even the indolent clock-work-moving Turks seemed to be infected with the raisin fever—they were bustling about in their papooshes, bawling and swearing the most expressive oaths, and all about raisins. I really thought I was destined never to get clear of this practical course of wholesale grocery, and almost determined, out of revenge, to expose all the filth and abomination that accompany the packing of raisins." He further remarks that Chesmé owes its prosperity exclusively to exportation of raisins, which are grown in immense abundance in its neighbourhood. Two facts are adduced in illustration of the extent of this trade; the first is, that with the exception of a small fine species of raisins called Sultanas, which are shipped at Smyrna, nearly all the fruit that goes in England by the name of Smyrna raisins, is sent from Chesmé; the other is, that during Mr. Mac Farlane's short stay at Chesmé, fourteen English vessels, three Austrian, and one American, left there with nearly full cargoes of raisins.

The fig, unlike the currant or the raisin, has the same name in the dried state as in the fresh, and is extensively eaten in both. In England the fig-tree can only be cultivated for its fruit by means of forcing; but in Asia Minor, in Turkey, in Greece, in the Levant, and along the southern shores of Europe generally, the fruit becomes so well ripened as to be largely available either in the fresh or the dried state. The first ripe figs in the East come to maturity about the latter end of June, though some few ripen earlier. The summer fig then begins to be formed, and this is the crop which is usually dried; and in some particular districts there appears a third crop, whereby the people are supplied with ripe fruit for a considerable part of the year. There are a thousand tons of dried figs imported yearly into England; so that, although there is not among us a very decided taste for fresh figs, yet they seem in the dried state to be held in considerable esteem. In the fig-growing countries the dried fruit constitutes a notable portion of the sustenance of the inhabitants; shewing that, in relation both to foreign and domestic consumption, the fig is a very important fruit to the countries where it arrives at full maturity.

The season for packing and shipment is no less a busy one at Smyrna than that of currants is at Chesmé. Mr. M'Farlane happened to have the luck of meeting with the one as well as the other. Speaking of the fig-trade at Smyrna, he says:—"This interesting branch of commerce was then in full activity. You could not stir in the narrow streets for the long lines of camels loaded with figs; you could hardly move on the Marina for the drums of figs rolling to be shipped; you could not sleep after three o'clock in the morning for the noise of some two or three hundred women and children (close under your lath and plank dwelling) employed in picking and packing figs. You heard nothing around you, and about you, but talk of figs.—'How are figs?—what 's the price of figs?' rang in your ears from morning till night, through the agreeable variety offered by the different organs of every man you met. You would have thought that the whole mind of Smyrna had become one vast receptacle of sweetmeats. If you asked for news, you were told 'figs were getting up.' If you complained of the heat, you were informed that 'the figs were lusciously ripe.' If you drank to a person at table, it was ten to one but his soul was below stairs with his drums. In short, the parody in the Rejected Addresses, 'In the name of the Prophet, figs!' would have been no parody at Smyrna during the long month of September." The same writer afterwards gives a description, by no means inviting, of the state of the ships in which the figs are exported, arising from the escape of some small worms from the figs themselves.

Eight years afterwards Mr. Hamilton, during his researches in Asia Minor, found that the Smyrna merchants were terribly annoyed in their fig-trade by the rapacious exactions of the Pacha or governor. Mr. Hamilton says:—"The merchants complained excessively of the monopoly of figs which Yacoub Pacha of Aidin had just established; the supply having also been extremely short this year. His practice closely resembled that of Mehemet Ali in Egypt; and by compelling the peasants to sell their crops to him at a price arbitrarily fixed by himself, viz.—60 piastres the quintal, he was enabled to contract and obtain the highest prices in the Smyrna Bazaar: these varied from 250 to 300 piastres the quintal."



[1, Hepialus humuli, female adult, caterpillar, and chrysalis; 2, Hepialus hectus; 3, Gallería cereana; 4, Yponomeuta evonymella; 5, Alucita hexadactyla; 6, Æcophora Linnæella; 7, Argyrolepia Lathomiana.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

British Moths—*concluded.*

The group of moths, at the head of this article, contains one or two remarkable and rare species, and some the caterpillars of which are more than ordinarily injurious; one species indeed as we shall see, not uncommon, especially in France and other continental countries, is the nuisance of the bee-keeper, and the more so, as during its operations within the hives the bees do not by their actions give notice of its ravages, but rather, as it would appear, endeavour to repair them by unceasing industry; consequently it is not until the mischief is effected that the presence of these insidious intruders is discovered: even in some districts of our island, the hives in certain years are despoiled to an alarming extent. The caterpillar of another species occasionally ravages the hop-gardens, and is the cause of serious loss; the plants fade and perish, and it is not until too late that the worm at the root is suspected.

Of another species, the encamping caterpillars are destructive to trees and shrubs; wherever they fix their encampment, there they devour every leaf, and are therefore perpetually on the move, like a marauding army, leaving desolation in their track. Let us, however, at once refer to the several species figured in the cut.

1. The Ghost Moth (Hepialus humuli), female adult, caterpillar and chrysalis.

This moth is common both in England and the Continent, making its appearance in June or July. It takes its name of Ghost moth from the manner in which the male becomes in the dusk of twilight alternately visible and invisible; for the upper surface is silvery white, the under surface dusky brown, and as it flies it is continually exposing, during its vacillating movements, first the upper surface and then the under, thus showing itself for an instant and then becoming suddenly lost. It frequents hop-grounds, and the plants often greatly suffer from the ravages of the caterpillar, which is an underground feeder, devouring the roots of the hop and thus destroying the plant. When taken hold of, this caterpillar struggles and twists itself about, and bites with considerable force. Towards the end of April or the beginning of May it fabricates for itself a long cylindrical cocoon, of silk intermingled with earth, of which the posterior extremity is closed by a few lax threads. The chrysalis is reddish brown with black stigmata. When the moth is ready to emerge, the chrysalis pierces by means of the spines on its head the anterior or fore end of the cocoon, and by the aid of little denticulations, with which the rings of the abdomen are provided, it pushes itself forwards till the sheath of the wings is above the surface of the ground; after this the insect works to liberate itself entirely.

The female has the upper surface of the wings of an ochre-yellow, with two oblique bands of yellowish red; the under wings are dusky, with the extremity reddish. In both sexes the body is yellow, the limbs brick-red.

The caterpillar is of a yellowish white, with the head, the upper part of the first segment, and mark on the second and the anterior limbs, of a glossy brown. The jaws and stigmata are black, and on the ten last rings are some little elevations of a yellow colour, from each of which springs a small blackish hair.

2. The Gold Swift (Hepiolus Hectus)

This species, which is common in our country, frequents the sides of woods and shady lanes, appearing in the month of July. The male is remarkable for its strange mode of flight; it elevates itself to about the height of a foot or two above the ground, and sweeps without advancing, from side to side, like a pendulum, continuing this vibratory movement for a considerable time. Should the entomologist approach and aim at its capture, it instantaneously falls to the ground and there rests motionless, with the limbs folded against the body. It is very probable that the females also occasionally practise this singular mode of flight. De Geer has given to this moth the name of 'Phalène pattes-en-masse,' because its hind limbs, in the place of the leg and tarsus, are furnished with a glossy club-like mass, in the form of a flattened pear, articulated at the small end to the extremity of the thigh.

The male has the upper surface of the first wings of a light reddish brown; with two oblique bands and a terminal row of small spots of a glossy yellowish white; the second wings are of a dusky brown.

The female has the first wings of a ferruginous brown, with grey markings, and the limbs as usual; the clubbed termination being peculiar to the male.

The caterpillar is an underground feeder, and is found at the roots of the heath.

3. The Honey Moth (Galleria cercana).

This moth is on the whole a rare species, or, at least, is locally distributed. Mr. Stephens, however, states that a considerable number of specimens have been captured at Birch Wood, near Bexley, others near Epping, and also in various parts of Suffolk and Devonshire, at the end of June or the beginning of July.

The caterpillar feeds on honey, wax, and bee-bread, and in some places is known to make great havoc in the hives; it destroys the comb as it eats its way, investing the fragments with a web which it spins as it goes on; and as hundreds are at work together, the destruction of the whole of the combs is soon accomplished. M. Godart says that on emerging from the egg it fabricates for itself with the substance of the wax a cylindrical tube fixed to the sides of the comb, or on the cells, in which it passes its existence secure from the attack of the bees, upon whose works it riots. This tube is proportioned to the size of the caterpillar, and at first is not thicker than a thread; but in proportion to the growth of the caterpillar it is lengthened and enlarged so as to give freedom of movement to its tenant; these tubes are sometimes a foot long, but mostly about five or six inches. Their interior is lined with fine silk, closely woven, and their exterior is covered with grains of wax and excrementitious matter all compacted together. In some hives three hundred of these destructive pests have been found, and the whole of the combs reduced to fragments, intermingled with dirt and webs. In various parts of Suffolk the ravages of the 'miller,' as the caterpillar is called, are well known.

When full grown the caterpillar constructs in its tube or gallery a cocoon of strong and closely woven silk, having the appearance of leather, and there changes into a reddish brown chrysalis.

In America an allied species displays the same habits, and is one of the pests of the bee-keeper.

The perfect insect appears first in April, and a second flight takes place in July. It is common on the Continent. This moth makes but little use of its wings, and rests during the day on the walls of buildings, or upon the covering of the beehives, which the female enters in order to deposit her eggs.

The male and female differ considerably in colouring, the wings in the latter being darker than on the former. The anterior wings are griseous, palish at the base, and darkest on the hinder margin. Near the inner margin are some purple brown streaks; the posterior wings are bright ashy grey, with the nervures and hinder margin dusky.

The caterpillar is flesh-coloured, with a chesnut brown head, and a palish line on the back.

4. The small Ermine Moth (Yponomeuta evonymella).

In passing along the lanes or through the fields, we may often see the hedges for yards completely stripped of foliage by the ravages of the caterpillar of this species, which lives in troops of hundreds, all crowded together under a common tent, the tissue of which resembles crape; the troop having devoured the leaves at one station move on to another, and spin a fresh tent; having stripped the foliage, they again move forwards, and repeat their movements at due intervals. Hence, though the hedges to a great extent are rendered leafless, they are crowded with filmy webs.

The perfect insect appears in July and August. The anterior wings are snow-white, with about four longitudinal rows of minute black dots; the posterior wings are brownish.

The caterpillar is ochre-yellow, with ten black dots on each side, and a brown head.

5. The dark Six-cleft Plume Moth (Alucita hexadactyla).

This species is very common in gardens, the caterpillar living upon various species of honeysuckle. The wings on the moths of the present genus are remarkable for their beautiful structure, being composed each of six nearly equal plumes, consisting of a shaft fringed with fine cilia-like feathers.

This elegant moth deposits a single egg, or at most two, on the undeveloped flower of the honeysuckle, and in a short time a little flesh-coloured naked caterpillar is produced, which introduces itself into the calyx, and devours all the internal parts, still green; when one flower is thus destroyed it seeks a second, and so on, till at length it spins a white transparent cocoon, in which it undergoes its change.

The perfect insect appears in June. The wings are ashy grey, with irregular markings of brown; the tip of each plume has a dot of black.

6. Linnæus' Moth (Æcophora Linnecella; Glyphipteryx Linneella, Hübner).

This species is common on the lime-trees in the vicinity of London, and appears to be local in its distribution. The caterpillar is not described. The anterior wings are orange-tawny, with the base and apex black, and three silvery dots placed in a triangle. The posterior wings are dusky, with a very slight metallic violet tinge. The habits of this little species are unknown.

7. The Silver-spotted Moth (Argyrolepia Lathomiana).

This species is so rare that one or two specimens only exist in the cabinets of entomologists. Mr. Stephens's words respecting this moth are as follow:—"Mr. Hawworth states that he has seen a single specimen of this fine insect, of which I believe a pair were taken near Tunbridge Wells, in July, 1831."

The anterior wings dusky gold colour, with a broad central fascia, two spots and some marginal dots of a pearly white or silvery hue. Posterior wings ash-coloured. Habits unknown.

VEHICLES AND TRAVELLING ON THE CONTINENT.—No. III.

We shall conclude this subject in the present article, by noticing some vehicles and modes of travelling of a somewhat humbler kind than those hitherto noticed.

Chars-à-banc.—There is a kind of vehicle used in France and Italy called a *char-à-banc*. It is true that this is not necessarily a humble vehicle; for newspaper readers will remember that Louis Philippe and Queen Victoria, with an illustrious party, rode in a char-à-banc when at the Château d'Eu; but those which are made for hire are generally an economical mode of conveyance. The char-à-banc may perhaps be deemed the national carriage of Switzerland. It is a kind of gig placed sideways upon four wheels, at a little distance from the ground, and is surrounded by leather curtains made to draw—whence it has been compared to a four-post bedstead on wheels. This is the smaller kind. There is a larger kind, in which there are two or more benches suspended by thongs across a kind of long waggon, and ranged one behind another. The small char-à-banc, the kind most used in travelling, is a very strong and light vehicle, and will hold two or three persons; they will go on roads where no other species of carriage would venture. It is convenient, from being so near the ground that the traveller can either enter or alight without requiring the horse to be stopped; but it is rather a jolting conveyance. In almost every village throughout Switzerland these small chars-à-banc can be hired, at about twelve francs a day, including the driver; but if the driver is dismissed at an hour which will not enable him to reach his home at night, he charges "back-fare."

There are in Hungary two modes of travelling, which, though not humble in themselves, are effected through the medium of the humbler classes of inhabitants, in a way different from the customary usages in most other countries. These are designated the *Bauern-post* and the *Vorspann*. The Bauern-post (peasant-post) is a separate posting establishment between Vienna and Pesth, set on foot by peasants who drive their own horses. It is twice as rapid as the ordinary posting, and one-third cheaper; but the traveller must provide his own carriage, as these peasants are not wealthy enough to have vehicles for hire. Mr. Paget, who availed himself of this mode of travelling when in Hungary, says:—"The pace at which these men take on a light Vienna carriage is perfectly wonderful, especially when the length of some of their stages is considered. The last stage between Vienna and Pesth cannot be less than forty miles, and, with a short pause of about a quarter of an hour to water, they do it for the most part at full gallop, and with the same horses, in four hours. It is glorious to see the wild-looking driver, his long black hair floating in the wind, as he turns round to ask your admiration when his four little clean-boned nags are rattling over hill and hollow at a pace which, for the first time since he left home, shakes an Englishman's blood into quicker circulation."

The *Vorspann*, according to the strict meaning of the word, is equivalent to the "horsing" of a coach by relays or stages; but its peculiar features are as follow:—It is part of the Hungarian system of internal government, that the peasant is compelled to give a certain number of days of forced labour in the year to his lord, and is also obliged to furnish the officers of the district or of the crown with post-horses on demand, to carry them from one part of the country to the other, on payment at a certain rate. This privilege was originally intended only for the Hungarian nobles and for the military and civil officers of government; but through the influence of these persons a stranger is often supplied with the same privilege, and the compulsion on the peasants is thus made more stringent than was originally intended. An order for Vorspann, called an *Assignation*, is issued by the vice-gespann (a sort of sheriff) of each district. On arriving at a post-station in a town or village, the traveller drives to the stadthause, and delivers his assignation to the *stadt-richter*, who, on sight of it, is bound to furnish him with horses onward to the next stage. The peasant-inhabitants of the village take it in turns either to furnish the horses, or pay others to keep horses constantly ready. During harvest-time many delays occur, owing to the difficulty of getting the horses from the fields and the natural unwillingness of the peasants to quit their work. The regular charge is not more than one-third that of posting; but a traveller, unless he is unusually mean, generally gives a tolerably large "trinkgeld" to the peasant, to lessen the burden of the system. The horses are small and ill-conditioned, and the rate of travelling is generally slow. It has been remarked—"Let the traveller in Hungary, however, never be in a hurry; it will only occasion a loss of temper; he that is in haste will find it of no avail, and he will be soon taught patience and resignation, not only at the door of the Hungarian post-house, but everywhere else in the country; it is contrary to the national character to do anything quickly, or in less than treble the time it would take elsewhere. The Hungarians themselves find a remedy for the evil in the constant and severe application of the stick to the shoulders of the driver—a measure which generally produces the desired effect. Strangers, however, should be cautious in resorting to this alternative, as from their hands it will scarcely be submitted to with the same equanimity."

In the Tyrol, Styria, Carinthia, Carniola, and the southern parts of the Austrian dominions, persons frequently travel *Einspann*, or in an *Einspänniger Wagon* (one-horse vehicle). Those vehicles are let out for hire, at a rate which, including vehicle, horse, and driver, amounts to about fourpence per English mile. The vehicles themselves are very little better than long wooden carts, with a single seat suspended by straps across the centre. Sometimes, instead of a seat, there is a sort of temporary straw mattress, raised behind, upon which the traveller and the driver lie stretched side by side.

In St. Petersburg there are in summer *Droschkies* and in winter sledges plying for hire. The former are very curious vehicles, utterly unlike anything known in England. In a single droschky, or droschky for one person, the traveller rides *astride* on a cushioned seat which extends from front to back of the vehicle. The vehicle is suspended on springs, and is placed on four low wheels. As soon as winter comes on, almost every part of Russia is covered with snow, and this forms a soft and smooth bed for the sledges, which then supersede almost universally the wheel-carriages. The droschkies in summer and the sledges in winter are seen clustered together in the streets for hire, or standing in a row close to the footway before some convenient or moveable mangers of wood filled with hay. The driver or *isvostchisk*, habited in a very picturesque costume, is recognised by a square tin plate hanging between his shoulders, on which is engraved the number of his vehicle.

There are in Ireland many features of travelling more nearly resembling those of some parts of the Continent than those of England. At the Cork Meeting of the British Association, Mr. Bianconi gave a very interesting account of the measures which he had adopted for providing cheap travelling in Ireland. Until the year 1815, the passenger accommodation in Ireland was confined to a few mail and day coaches on

the great lines of road; but in that year Mr. Bianconi began to establish *cars*, which may now be deemed the characteristic vehicles of Ireland. The first car took the route from Clonmell to Cahir, and from thence to Tipperary and Waterford; others took the routes from Clonmell to Cashel, from Clonmell to Waterford, from Longford to Ballina, from Athlone to Galway, from Limerick to Tralee; and in short the system was by degrees so extended that Mr. Bianconi has now more than a hundred vehicles, chiefly cars, which convey passengers at a rate of eight or nine miles an hour, and for a charge of about five farthings per mile on an average. These vehicles travel nearly four thousand miles every day, and change horses at about one hundred and forty stations.

What kind of vehicles they are which obtain the name of *cars* in Ireland, we may learn from the lively description by Mrs. S. C. Hall. There are three varieties—the "covered car," the "inside jaunting-car," and the "outside jaunting-car." The first of these is a comparatively recent introduction, its sole recommendation being that it is weather-proof, for it effectually prevents a view of the country, except through two little peep-hole windows in front, or by tying back the oil-skin curtain behind. This kind of vehicle is found mostly in the towns of Ireland, and seems to fill the place of the hackney coaches and cabs of England.

"The inside jaunting-car" is quite exposed to the weather over-head, and only obtains the designation of "inside" from being closed at the sides rather more than the "outside jaunting-cars," which are the cars *par excellence* of Ireland. These latter are exceedingly light vehicles, pressing very little upon the horse, and being both safe and convenient. It is always driven with a single horse. The driver occupies a small seat in front, and the travellers sit back to back, with a space called the "well" between the two seats, for the reception of luggage. As the passengers sit sideways, they can see only one half of a street or a view, and this is to travellers one among the few inconveniences of these cars. If there be only one passenger, the driver usually places himself in the opposite seat to balance the car. There is a footboard which comes down over full half of the wheel, and this gives such a great breadth to the vehicle, that it is scarcely possible for an overturn to take place. The cars used by the peasantry are more primitive, perhaps, than any vehicles to be found in England—except a wheelbarrow or a truck. They have wheels cut out of a solid block of wood, and the car itself consists simply of a boarded stage of planks, on which straw is laid, and on which the passengers sit. These rude vehicles are, however, fast becoming obsolete.

The cars established by Mr. Bianconi are generally on the principle of "the outside jaunting-cars," but of various sizes according to the number of passengers they are intended to contain, which varies from four to sixteen, and which are drawn by from one to four horses. Mr. Bianconi has a regular factory at Clonmell, where he builds all his own cars. The charges to travellers vary from one penny to twopence halfpenny per mile, according to the turnpikes, the quantity of business on the road, and the speed of the car, which is at the slowest about six miles an hour, and at the quickest about nine. Passengers on these cars are said to be much more comfortable than on the outside of coaches, since they are furnished with dry and comfortable horse-hair cushions and aprons. In wet weather he never allows a car to go more than two stages without changing the cushions.

Mr. and Mrs. Hall, in their work on Ireland, give an interesting account of the circumstances under which Mr. Bianconi established this extensive car-system, and the steps by which he has advanced. They consider the whole system to have worked incalculable benefits to Ireland generally. "In the interior of the country, from which farmers come to the little villages, they have only a few places for obtaining their commodities, and that at an enormous rate; but since the introduction of these cars, people in business, who hitherto were obliged to go to market at a very heavy expense, which prevented their doing so frequently, now find their way to the larger towns, and have been enabled to secure supplies at once from the first-cost market; and from the cheapness of bringing the articles home, they were enabled to reduce their prices considerably, and in those districts the consumption has, in consequence, wonderfully augmented, and shops or fresh sources of competition continually increase, thereby enabling parties to use articles hitherto inaccessible to them. A great saving of time is also effected: for example, it took a man a whole day to walk from Thurles to Clonmell, the second day to transact his business, and the third to walk back: now, for seven shillings, he purchases two clear days, saves himself the trouble of walking sixty English miles, and has four or five hours to transact his business." This mode of estimating the advantages of a mode of conveyance by comparing it with walking, may seem to an English reader fitted rather for the sixteenth or seventeenth than for the nineteenth century; but this is precisely one of those points in which Ireland must *not* be judged by analogy with England. Persons now living can look back to the time when Irish farmers and country dealers had to trudge it on foot, rather from want of conveyances than from actual poverty, to places lying many miles distant from their homes, and it is only when taken in reference to such a state of things that the value of the system established by Mr. Bianconi can be duly estimated.

Chinese Agriculture.—We passed the batteries which had so recently been the scene of such dreadful slaughter, and, stemming a strong current, proceeded rapidly up the river. The country through which it wound its way was a perfect flat as far as the eye could reach, and in as high a state of cultivation as the market-gardens around London; small farm-houses stood in every direction, neatly encircled with flower-gardens, the whole presenting a perfect picture of wealth, fertility, industry, and comfort: and when we were informed—a circumstance we had every reason to believe perfectly true—that the same state of things existed not only throughout the whole of this but of all the neighbouring provinces, any one of which, as regards extent, would make a handsome kingdom for an European potentate, some slight idea may be formed of the endless internal agricultural wealth of the Chinese empire, and the little concern the Emperor of this mighty country has been accustomed to bestow on foreign nations, their commerce, trade, or anything else concerning them. Numerous implements of agriculture, which we supposed only to be known to the most scientific and highly-instructed European nations, were discovered in great numbers, and in constant use among them, from the plough and common harrow to the winnow and threshing-machine, with which scarcely any farm-house, however small, was unprovided. Added to which, for the purpose of irrigation, scarcely any considerable field that did not possess its chain-pump, for the purpose of irrigating their crops by drawing water from the lower levels, with comparatively small labour to themselves; from which models I have not the least doubt those at present in use in our navy or merchantmen were taken.—*Recollections of Service, by Capt. Cunynghame.*

Irresolution.—In matters of great concern, and which must be done, there is no surer argument of a weak mind than irresolution; to be undetermined where the case is so plain, and the necessity so urgent. To be always intending to lead a new life, but never to find time to set about it: this is as if a man should put off eating, and drinking, and sleeping, from one day and night to another, till he is starved and destroyed.—*Tillotson.*



Chester Cathedral.]

CATHEDRAL OF CHESTER.

Early in the times of the Saxons there was a religious house, dedicated to St. Peter and St. Paul, at Chester, which was then an important fortified place on the English frontier next Wales, and had rendered itself remarkable as one of the very last of the strong positions wrenched from the native British. In 875 the event occurred to which Chester chiefly owed its celebrity in later times. We have made frequent mention of Wulfhere in connexion with the kingdom and diocese of Mercia, and the five sees taken out of it, one of which was Chester. That remarkable convert from paganism had, it seems, a daughter, scarcely less remarkable than himself, who became a nun or abbess of Chester (William of Malmesbury), and after her death her relics were placed in an honoured sepulchre at Heanburgh, where they remained for two centuries; until fear of the Danes led to their being removed to Chester for safety. A new community of secular canons, in honour of this sainted lady and St. Oswald, was now formed at this place, under King Athelstan, and grew rapidly into notice; but at the Norman Conquest it was deprived of much of its lands, and the great Norman Earl of Chester, Hugh Lupus, swept it aside altogether, to make room for a Benedictine colony from Bec, in Normandy. "The earl," says Pennant, "possibly did not care to trust his salvation to the prayers of the Saxon religious," at a time when sickness and a troubled conscience made him feel that there was particular need of effectual intercession for him with the offended majesty of heaven. He richly endowed the new Benedictine brotherhood, and his countess Ermentruda and his numerous tenants followed his example, so that the abbey was inundated with the good things of this life in all shapes—lands, manses, chapels, churches, woods, plains, and tithes, together with privileges of fishing with one vessel and ten nets, and all the profits of the profitable feast of St. Werburgh. Before the great abbey-gate, at this feast, were ranged the booths for the merchants, who brought wares of all kinds from various lands, and disposed them beneath coverings of reeds, which the monks were especially chartered to gather from Stanlaw Marsh. Here, too, was erected the moveable theatre for the performance of the Chester Mysteries, attributed by some writers to the inventive brain of a monk of this abbey, Randle or Ralph Higden, and by Mr. Markland to one of the earlier brethren, or to several of them unitedly. Two or three of the manuscripts of these Chester interludes have come down to us; there are twenty-four mysteries in each, and their subjects are the most striking incidents of the Scriptures, both old and new. There was a strange privilege (and one on which many reflections might be offered, were they not irrelevant to our present purpose) afforded to malefactors coming to the great fair —they were not to be arrested, however heinous their crimes might be, unless they committed some *new* offence. The concourse of loose people which such a regulation ensured we might have fancied rather detrimental than otherwise to the interests of Chester. There was an occasion, however, when it proved of signal service, if not to the town, to its earl, Randle the Third, who being surrounded in the castle of Rhudland by a Welsh army, and in imminent danger, dispatched a messenger to Roger de Lacy, his general or constable, for assistance. Lacy was attending the fair, when immediately he and his son-in-law, Ralph Dutton, collected a numerous body of minstrels, musicians, and various idle persons, and led them to the relief of his lord. The Welsh, descrying from a distance the approach of this extraordinary army, and of course unaware of the materials of which it was composed (for Lacy had done the best he could to place them in battle array), broke up the siege, and the earl was saved. The grateful lord bestowed some remarkable privileges on Lacy for his prompt and very original services—he had "full power over all the instruments of the earl's preservation." Every anniversary of the event was also to be distinguished by a gathering of the county musicians and minstrels, who "were to play before him and his heirs for ever, in a procession to the church of St. John; and, after divine service, to the place where he kept his court. The minstrels were then to be examined concerning their lives and conversation, and whether any of them played without annual licence from their lord, or whether they had heard any words among their fellows tending to his dishonour." (Pennant.) The annual procession of the Chester minstrels was not discontinued before the middle of the last century. The privileges enjoyed by Lacy and his heirs descended to the Dutton family, whose steward presided over the courts for the exami-

nation of the minstrels, from whom they claimed at the feast four bottles of wine, a lance, and a fee of fourpence halfpenny. The jurisdiction of the Duttons over the minstrels has been recognized by parliaments as late as George II., and clauses "saving their rights" have found their way into modern Vagrant Acts.

We have other curious glimpses afforded us of the manners and pastimes of the Benedictines of St. Werburgh. The hospitality of the abbey appears to have been of the most splendid character; its dependants resembled those of the great barons in number and importance. A curious document shows us that at a period when the number of the actual monks was by no means considerable (supposed about twenty-eight), the abbey cook was allied to families of importance; that his office was honorary—a feudal tenure by which he held several manors; and that he had kitchen perquisites worth a regular recovery in the Portmote Court. Among the remains of the abbey may be mentioned the great abbey-gate, and the cloisters, which form a quadrangle one hundred and ten feet square, in the style of the fifteenth century. The south walk is gone, but on that side six semicircular arches on short pillars indicate the places of sepulchre of the Norman abbots. We need hardly say that the refectory, or dining-hall of the abbot and his brethren, was a noble apartment; where good living was so highly appreciated there was not likely to be a want of ample and handsome accommodation: the style is of the thirteenth century. The bishopric of Chester dates from the reign of Henry VIII., who founded within the site of the abbey of Werburgh a new episcopal see and a cathedral church, which foundation Elizabeth confirmed, and added to its endowments, in order "that the holy gospel of Christ may be preached constantly and purely, that the youth of the kingdom may be instructed there in good learning, that hospitality may be exercised by the dean and prebends aforesaid, and the poor be there continually relieved." The cathedral thus instituted is an irregular, spacious, heavy building, of the red stone of the county, and chiefly of the times of Henries VI., VII., and VIII. The space occupied by the conventual buildings is very great, and we scarcely need any other evidence of the grandeur of the ancient establishment. The sculptured stone case of the city of Chester's tutelar saint, Werburgh, is used as the bishop's throne. The chapter-house of the cathedral is interesting, not only for the great beauty of the architecture, but on account of the burial in it of Hugh Lupus, by his nephew, the builder of the chapter-house, Randle the First. In 1724 the remains of the great earl were there discovered in a stone coffin, on which was sculptured a wolf's head, in allusion to the name. There was originally, it seems, a rhyming inscription annexed, commencing—

> Although my corpse it lies in grave,
> And that my flesh consumed be,
> My picture here now that you have,
> An earl sometime of this city,
> Hugh Lupe by name, &c.

The sword of Hugh, we may observe, is preserved in the British Museum.

OCCUPATIONS OF THE PEOPLE IN GREAT BRITAIN.

THE Commissioners for taking an account of the population of Great Britain have just completed their valuable labours by the publication of the volume containing the return of the occupations of the people. It is of the first importance to ascertain the total population of a country, but to know the numbers of the people engaged in every branch of industry places in the hands of the statesman facts of still higher value. We need not stop to explain the means adopted in order to obtain the results of this elaborate inquiry; but it is necessary to state that while the return of occupations under the census of 1831 gave only the occupation of males aged twenty and upwards, the present one shows the occupation carried on by persons of every age and of both sexes.

In the first instance, we may be content to mark out broadly the divisions to which the 18,844,434 inhabitants of Great Britain belonged in 1841, and who are classified as follows:—

		Total Persons.
Agriculture		1,499,278
Farmers and Graziers	307,065	
Agricultural Labourers	1,138,563	
Gardeners, Nurserymen, & Florists	53,650	
Commerce, Trade, and Manufactures		3,110,376
Commerce and Trade	1,969,470	
Manufactures	1,140,906	
Non-Agricultural Labourers		761,868
Army, at home and abroad, including Army on Half-pay		131,464
Navy and Merchant Seamen, Fishermen, Watermen, &c.		288,630
Clerical, Legal, and Medical Professions		63,184
Clerical	23,543	
Legal	17454	
Medical	22,187	
Other Educated Persons engaged in Miscellaneous pursuits		142,836
Government Civil Service		16,959
Parochial, Municipal, Police, and Law Officers, &c.		25,275
Domestic Servants		1,165,233
Males 20 and upwards	164,384	
Males under 20	92,024	
Females 20 and upwards	562,734	
Females under 20	346,091	
Persons returned as Independent		511,440
Almspeople, Pensioners, Paupers, Lunatics, and Prisoners		200,026
Total as above		7,816,569
Residue of the Population		
Males 20 and upwards	276,526	
Males under 20	3,434,456	
Females 20 and upwards	3,594,366	
Females under 20	3,692,517	
Grand Total		18,844,434

A few explanations will render the above figures more intelligible. Under the head "Independent" are included "all who support themselves on their own means without any occupation," and it therefore comprises poor widows and aged men who are living upon their savings, while it does not include many large capitalists who are returned under the occupations in which they are engaged. The large number under the head "Residue of the Population" is accounted for as follows:—Only 2½ per cent. of this class, or 1·46 per cent. out of a population of nearly nineteen millions, are males aged twenty and upwards, returned as being neither paupers nor persons of independent means. They comprise persons who reside with their parents, and perhaps assist them in their business; those who are supported by the labour and industry of their wives; and, lastly, persons temporarily out of employment are included. The males under 20 comprise 31 per cent. of the class headed "Residue of the Population;" the females above 20 are 32 per cent.; and the females under 20 are 33 per cent. Of persons under 20 there are, first infants and children of tender years of both sexes, who are unfit for any occupation; of females above 20, there are a large number of unmarried women who live with their parents; and, again, there are the wives of professional men and of persons in many of the branches of industry, who live upon the profits and earnings of their husbands.

The census was taken on the 7th of June, 1841, and there was ascertained to have been 22,303 persons who had on the previous night slept in barns, tents, pits, and in the open air; and there were also 5018 persons enumerated as having been travelling on the same night.

It will be seen that the largest number of persons enumerated under any single head comprises domestic servants of both sexes, who amounted to 1,165,233, being above six out of every hundred of the entire population, or 14·9 per cent. of the total number of persons engaged in industrious pursuits. The number of female servants was 908,825.

The next most numerous class is the agricultural labourers, 1,138,563 in number, of whom 50,398 were females. They formed 75·9 per cent. of the population engaged in agriculture in Great Britain, the proportion of farmers and graziers being 20·5 per cent.; and of gardeners, nurserymen, &c., 3·6 per cent. In England the proportion of agricultural labourers was 77·8 per cent., and that of farmers and graziers 18·3 per cent. The proportionate number of agricultural labourers to the population whose employment is agricultural varies from 87·8 per cent. in Berkshire, and 87·1 in Hertfordshire, in which two counties it is highest, to as low as 60·5 per cent. in Westmoreland, with its dalesmen and statesmen, and to 60·9 in Derbyshire with its numerous small freeholds, in both of which counties the labours of agriculture are principally carried on by the farmer's own family. In Bedfordshire, Buckinghamshire, Oxford, and Essex, the proportion of agricultural labourers is above 86 per cent. of the total number whose employment is agricultural; in Hampshire, Sussex, Wiltshire, and Suffolk, it is about 85 per cent.

But comparing the agricultural population, including graziers, gardeners, nurserymen, and florists, with the total population, it will be seen that the proportion is less than 8 per cent. In England it is 7·7 per cent.; in Wales 6·8 per cent.; in Scotland 8·8 per cent.; and for the whole of Great Britain 7·9 per cent.

The proportion of persons engaged in trade and manufactures to the total population is 16·9 per cent. in England; 14·2 per cent. in Wales; 18·1 per cent. in Scotland; and 16·5 per cent. for Great Britain.

For Great Britain the population employed in commerce, trade, and manufacture is 39·6 per cent. of the population engaged in every kind of occupation, and the agricultural population is 16·5 per cent.

The twelve counties in which the proportion per cent. of persons engaged in agriculture is largest in proportion to the total population of each county are the following:—

	Proportion per cent.		Proportion per cent.
Lincoln	15·9	Bucks	14·0
Rutland	15·6	Suffolk	13·9
Essex	14·8	Cambridge	13·9
Hereford	14·6	York, N. R.	13·8
Huntingdon	14·5	Bedford	13·8
Wilts	14·1	Berks	13·2

The ten counties in which there are, as compared with the total population, the largest proportionate numbers engaged in trade and manufacture are—

	Proportion per cent.		Proportion per cent.
Lancaster	28·1	Middlesex	20·0
York, W. R.	24·6	Leicester	19·2
Chester	23·5	Derby	18·9
Warwick	21·9	Stafford	18·7
Nottingham	20·6	Worcester	16·7

In the twelve agricultural counties, the actual increase of the population from 1831 to 1841 was 9·2 per cent.; but taking the excess of births over the deaths, the increase was 11 per cent.; and it follows, therefore, that 2 per cent. of the population had migrated to other parts of the country where there was a greater demand for their labour.

In like manner, in the ten manufacturing counties the actual increase of population during the same period was 16·6 per cent.; but, taking the excess of births over deaths, the increase was only 10·6 per cent.; and therefore 6·6 of the population of these counties was added by migration from other counties. In Middlesex 30, and in Lancashire 21 persons, out of every 100 living in those counties in 1841, were born in other counties.

The Commissioners remark:—"The increase of the population generally in the agricultural counties is very small, while in the manufacturing and mining seats of industry it far exceeds that of England generally. It is also obvious, that while the natural limits of the extent of land in cultivation must reduce the numbers returned in cultivating it, the unlimited nature of the supplies afforded of the produce of other countries must make the extent of demand the only measure of the number of hands that may be employed commercially in converting the raw material into the articles required for clothing or luxury, and in disposing of them, when converted, among home and foreign customers." Thus, with the increase of manufactures the *proportion* of the agricultural population has been constantly diminishing. In 1801 it was 35 per cent., or more than one-third; in 1821 it was 33 per cent., or scarcely a third; in 1831 it was 28 per cent.; and in 1841 it was 22 per cent.;—that is, agriculture gave direct employment to little more than one-fifth engaged in industrious pursuits, while four-fifths were employed in non-agricultural occupations.

The number of persons in Great Britain engaged in textile manufactures—as weavers, spinners, and factory-workers—is returned at 800,246. Besides supplying the home market, they produce goods to the value of 25,000,000*l.* for foreign markets, or one-half of our exports. It is, in a great measure, by the industry of this class that England obtains the means of purchasing tea, coffee, sugar, wines, and other foreign productions. The numbers engaged in the manner above mentioned, in each branch of manufacture, are as follow:

Manufacture.	Persons employed.
Cotton	377,662
Hose	50,955
Lace	35,347
Wool and Worsted	107,296
Silk	83,773
Flax and Linen	85,213
Fabric not specified	162,742

The hose and lace manufactures are branches of the cotton manufacture, and giving to this great staple a due proportion of the persons employed on those textile fabrics whose nature is not specified, it will be seen that, in a time of depression, the cotton manufacture, directly employed nearly half a million of persons. The age and sex of the 800,246 persons employed in textile manufactures generally were—

	Aged Twenty & upwards.	Under Twenty.	Total.
Males	344,121	109,260	453,381
Females	211,070	135,795	346,865
	555,191	245,055	800,246

The other leading branches of non-agricultural industry are those connected with the natural resources of the country, its mines and minerals. The number of persons employed under ground in mining operations, is one-eighth of the total number of those who are employed in cultivating the surface; and in Durham there are nearly twice as many persons employed under ground as on the surface. The total number of miners returned for Great Britain is 193,625, of whom 118,233 were employed in coal-mines, 275 in manganese, and

208 in salt-mines; and in the case of 31,173 miners it was not specified in what description of mine they worked. The number employed in other descriptions of mines and the number engaged in the manufacture of the produce raised from them were as under:—

	In the Mine.	In the Manufacture.	Total.
Iron	10,949	29,497	40,446
Copper	15,407	2,126	17,533
Lead	11,419	1,293	12,712
Tin	6,101	1,320	7,421
Metal not specified		1,973	1,973

The workers in metal are therefore 80,085. The value of the exports of our mines and metallic manufactures is about 5,000,000*l*. It is interesting to know the numbers employed in one or two other kinds of manufacture:—

Manufacture.	Persons employed.
Pottery, China, and Earthenware	24,774
Glass and Glass Bottles	7,464
Gloves	9,225
Engines and Machines	16,550

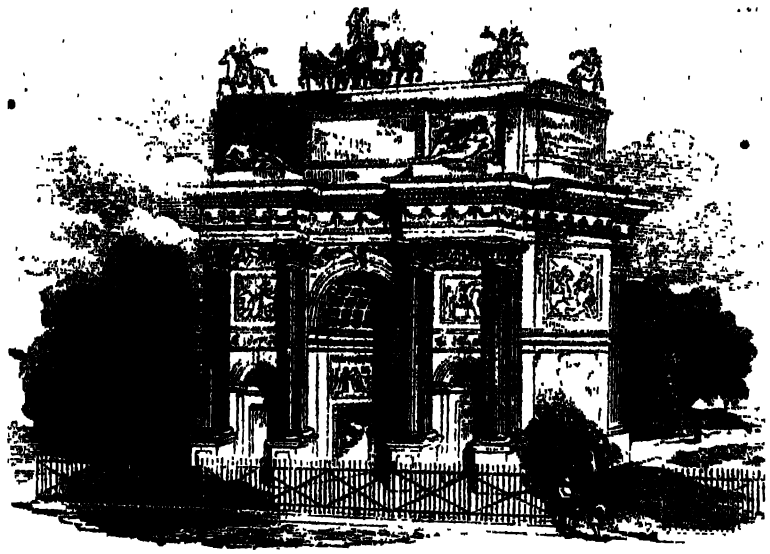
Of handicrafts, the largest numbers under one head are boot and shoe makers, the number returned being 214,780; but an analysis of the minor divisions of employment would require a separate notice.

The Sphinx.—Its huge recumbent body, and its enormous outstretched fore legs, are almost entirely buried in sand and rubbish. The head alone is twenty feet high. The face (which lays claim to be regarded as a portrait of Thothmes IV., whom many believe to have reigned during the bondage of the Israelites in Egypt, or shortly before or after, and who may have been the very Pharaoh in whose reign the Exodus took place) is much mutilated; the nose being broken off. This loss gives to the expression of the face much of the negro character: but the features of the countenance of the ancient Egyptian, as well as the comparative lightness of complexion, widely distinguished him from the negro; and the nose of the former greatly differed from that of the latter. At first the countenance of the Sphinx, disfigured as it is, appeared to me absolutely ugly; but when I drew near, I observed in it a peculiar sweetness of expression, and I did not wonder at its having excited a high degree of admiration in many travellers. The whole of this extraordinary colossus was doubtless painted: the face still retains much of its paint, which is red ochre, the colour always employed by the ancient Egyptians to represent the complexion of their countrymen; yellow or pink being used by them for that of the Egyptian women. All that is visible of the Sphinx is hewn out of a mass of limestone rock, which, perhaps naturally presented something of the form which art has given to it.—*The Englishwoman in Egypt, by Mrs. Poole.*

A Visit to a Jew in Jerusalem.—On the level brow of Zion, exactly opposite to the tower of Hippicus, is the residence of the wealthiest Jew in Jerusalem. On passing through the outer door of his dwelling, we entered a small court, overshadowed by a vine-covered trellis, on one side of which are the principal apartments, which we found comfortable and in good order. This personage is mentioned by many travellers, and he presents a remarkable instance of the two motives which popular prejudice generally supposes to actuate the Jew—intense love of money, and an equally tenacious adherence to the traditions of his people. His career is singular; in his youth he had been a wanderer under the burning tropics, in England and in Spain, and by various means having accumulated a sum sufficient to render him the envy of his poor abject brethren, he repaired to the city of his fathers, to die and be buried in the Valley of Jehoshaphat. On entering his dwelling, we found him seated on the low divan, fondling his youngest child; and on our expressing a wish to draw the costume of the female members of his family, he commanded their attendance; but it was some time before they would come forward; when, however, they did present themselves, it was with no sort of reserve whatever. Their costume is chastely elegant. The prominent figure in the sketch is the married daughter, whose little husband, a boy of fourteen or fifteen, as he seemed, wanted nearly a head of the stature of his wife, but was already chargeable with the onerous duties of a father. An oval head-dress of peculiar shape, from which is flung a long veil of embroidered muslin, admirably sets off the brow and eyes; the neck is ornamented with bracelets, and the bosom with a profusion of gold coins, partly concealed by folds of muslin; a graceful robe of striped silk, with long open sleeves, half laced under the bosom, invests the whole person, over which is worn a jacket of green silk, with short sleeves, leaving the white arm and bracelated hand at liberty. The elder person on the sofa is the mother, whose dress was more grave, her turban less oval, and of blue shawl, and the breast covered entirely to the neck, with a kind of ornamental gold tissue, and over all is seen a jacket of fur: she was engaged in knitting, while her younger daughter bent over her in conversation: her dress is similar to that of her sister, but with no gold coins or tight muslin folds; and instead of large ear-rings, the vermilion blossom of the pomegranate formed an exquisite pendant, reflecting its glow upon the dazzling whiteness of her skin. We were surprised at the fairness and delicacy of their complexion, and the vivacity of their manner. Unlike the wives of Oriental Christians, who respectfully attend at a distance till invited to approach, these pretty *Jewesses* seemed on a perfect footing of equality, and chatted and laughed away without intermission.—*Bartlett's Walks about Jerusalem.*

Our supposed inexhaustible Stores of Coal.—The opinion that our stores of coal are all but inexhaustible rests wholly on assumed data, and not upon any accurate and detailed statistical accounts, such as alone could warrant a confident opinion. This question will ere long become a subject of serious concern, unless some measures are taken to found our calculations on a solid basis. It is an easy matter to assume that a considerable thickness of available coal extends over hundreds of square miles, but the different opinions formed by men of the highest respectability and talent strongly prove how meagre and unsatisfactory are the only data on which their estimates are founded. It is not, however, the mere quantity of coal that is to be considered. Especial regard must be had to its quality, depth, thickness, extent, and position. Many of the inferior seams can only be worked in conjunction with those which, by their superior quality, repay the expense of working them at depths varying from three hundred to six hundred yards, and it may readily be conceived that inferior coal only could not be profitably raised from pits equal in depth to three or four times the height of St. Paul's cathedral, unless the price of such inferior coal was raised to more than the present price of the best coal. It is the additional expence and consequent additional difficulty of competing with other countries that is the vital question to be considered. It is not the exhaustion of mines, but the period at which they can be profitably worked, that merits earnest and immediate attention, and it is with especial reference to this that the value of and increasing necessity for mining plans is so strongly apparent. If those inferior seams are not worked now, in conjunction with the better seams, they will, in all probability, be wholly lost, and to a certainty they must be so if no permanent registration is adopted to show what were the former circumstances of each mine.—*T. Sopwith, on the National Importance of preserving Mining Records.*

Bedouins of Abyssinia.—On our march I had an opportunity of observing a family of Bedouins moving with all their property, houses included, towards Killaloo in search of water. Seven cathels were laden with mats and the bamboo frames of the native wigwams. The roof canes belonging to these rose on each side of the animals, with a long tapering curve behind, and high above them into the air. The imagination easily furnished these with some light gossamer structure, and in this manner suggested to itself a new poetical flying-machine, vieing with the Pegasus of mythological fable. Besides the hut, each camel bore a considerable amount of household furniture—black earthenware pots, contained in a kind of cage protectors made of some flexible shrub; the family store of palm-leaves for the industrious housewife to weave into mats or to make the native rope; a few handsome-looking baskets hung round with shells suspended from thongs; and a child or two placed amidst the whole, or perched upon the top, sometimes holding in its arms a noisy bleating kid or lamb that was too young to walk with its dam. Some older children, boys and girls, quite naked, assisted their mothers in driving before them the flocks of sheep and goats. No men accompanied this party, but their absence was accounted for by their being engaged in tending a herd of some thousands of oxen, whose dusty track I observed, like a low red cloud some miles in extent, about a league to the west of us.—*Johnston's Travels in Abyssinia.*



[Principal Front of the Arch of Peace.]

THE ARCH OF PEACE, MILAN.

The Arch of Peace (Arco della Pace) at Milan, a drawing of which we now present to our readers, may be ranked amongst the most beautiful specimens of modern architectural sculpture. It adorns the Italian termination of that stupendous road made by Napoleon across the Alps, which is usually termed the Simplon, from a mountain of that name over which it is carried. The arch also was commenced by Napoleon, who employed the Marquis Cagnola to erect a marble trophy of his victories. It was far from being complete at the time when Bonaparte fell like a meteor from his throne, but the Emperor of Austria, being much struck with the beauty of the design, ordered the architect to proceed. Of course all the representations of Napoleon's conquests were abandoned, and the sculptures which at present embellish it illustrate as many Austrian victories as upon a minute search could be reckoned up, eked out with a few heathen gods and goddesses. For example, the relievo which was originally intended to represent the Emperor's triumphal entry into Berlin, has been altered so as to picture the entry of the allies into Lyons.—Thus the arch with all its carvings may be well taken to be

> "Vanity's hieroglyphic—a choice trope
> Of Fortune's rhetoric;"

like the column, designed for a purpose similar to that of the arch, which Wordsworth saw lying near the road-side after the Emperor's fall.

The Arch of Peace was not completed until 1838. It is built entirely of white marble, and is placed on the Piazza d' Armi (the Hyde Park of Milan), over against the great barracks erected on the site of the ducal palace, and partly out of the ruins. It is about seventy-four feet high, and almost as long, crowned with bronze figures on horseback at the corners, and a central piece of bronze-work representing Peace in a Sestiga, or chariot drawn by six horses. A staircase conducts through the body of the building to the summit, from which position the stranger has a splendid panoramic view spread out before him; on one side, the Alps with their snowy and serrated tops stand against the sky; on the other, the Apennines are dimly descried; and the fertile plain of Lombardy lies between. The reader perceives that the arch is pierced by three arcades; all of them are richly sculptured, and the largest is forty-four feet in height. Four fluted Corinthian columns stand before each front, with half-columns behind. These columns are thirty-eight feet high, and are each cut out of a single block of Crevola marble. On the side towards the city there is a dedicatory inscription to Francis I. by the people of Lombardy. The principal events emblematised upon the arch are the passage of the Rhine in 1813, the foundation of the Lombardo-Venetian kingdom, the Battle of Leipsic, the Congress of Vienna, and the conference of the three monarchs previous to their "Holy Alliance." General Mack's disgraceful capitulation of Ulm, with a slight alteration, was made to represent the capitulation of Dresden. The total cost has been estimated at nearly 150,000*l*. The buildings on each side in the Doric style, also designed by Cagnola, add to the effect of the arch. They are used as police and custom houses. The Milanese are proud of their Arco della Pace, and they have reason to be so, for it has a beautiful effect from every point of view. Nothing of the kind, of recent erection, can be compared with it without suffering by the comparison, for even the Arc de l'Etoile at Paris, though considerably larger, is inferior to it as a work of art. The Parisian arch has certainly the advantage of size, for the one we have been describing would almost pass bodily through its road-way. The principal point of difference between the two, in other respects, is that the French erection has only a single arcade from face to face, whilst it possesses a transverse passage from end to end.

THE DAMP AND DRY WINDS OF SOUTH AMERICA.

In the warm districts of America, as of Africa and Asia, the alternations between wet and dry, and the effects of those alternations on the surface of the country, are more striking than in countries farther north. When rain does fall, it is generally extremely heavy; when none falls, the earth becomes parched up to an excessive degree. Even where the climate is not decidedly hot, as in the provinces of La Plata, the peculiar conformation of the country leads to phenomena to which we are almost strangers in Europe. A few instances will illustrate this.

When Mr. Darwin was making his geological

rambles in South America, a few years ago, he was told by the inhabitants many details respecting the great drought to which that part of the continent is occasionally exposed. The period included between the years 1827 and 1830 was called by them the "gran seco," the great drought. During this time so little rain fell, that the vegetation, even to the thistles, failed; the brooks were dried up, and the whole country assumed the appearance of a dusty high road. This was especially the case in the northern part of the province of Buenos Ayres. Great numbers of birds, wild animals, cattle, and horses, perished from the want of food and water. One million head of cattle were supposed to have died from want of drink in this one province alone. One proprietor had, previously to these years, twenty thousand head of cattle; at the end of the "gran seco" he had not one.* Although the district which he inhabited is one of the finest in the country, yet so utterly were the cattle exterminated, that others had to be brought by sea from distant parts for the support of the inhabitants. Some of the animals roamed from the "estancias," or farms, and, wandering far to the south, became mingled together in such confusion, that a government commission was sent from Buenos Ayres to settle the disputes of the owners. Another curious source of dispute arose; the ground being so long dry, such quantities of dust were blown about, that the landmarks became obliterated, and people could not tell the limits of their estates.

The cattle on this occasion were seen to rush in thousands into the river Parana; where, being exhausted by hunger, they were unable to crawl up the muddy banks, and thus were drowned. One of the arms of this river was so full of putrid carcasses, that the smell rendered it quite impossible to pass near that way. It was supposed that several hundred thousands of these animals thus perished in this one river. Their bodies when putrid floated down the stream, and thus became grouped up in particular inlets and recesses. So much water evaporated from the smaller rivers, that the remainder became quite salt; and the drinking of this salt-water killed many of the animals.

Such droughts as this occur in other warm regions occasionally. Thus Captain Owen relates the following curious incident as having occurred in Africa:—"A number of elephants had some time since entered the town (Benguela) in a body, to possess themselves of the wells, not being able to procure any water in the country. The inhabitants mustered, when a desperate conflict ensued, which terminated in the ultimate discomfiture of the invaders, but not until they had killed one man and wounded several others." A tendency to periodical droughts is observable in many countries; and it has also been observed that two countries, distant many thousand miles apart, have a drought at the same time. Thus Captain Sturt says that 1828 was a drought year in Australia, as it was also at Buenos Ayres. About the years 1791 and 1792 there was a severe drought at St. Helena; at Montserrat the seasons were unusually dry; at Cape de Verd Islands the drought was so excessive as nearly to depopulate the islands; while in India, in some of the provinces, half the inhabitants perished by the parching up of the rice crops through drought; and five thousand poor people walked or ran a distance of fifty miles, to a spot where a ship was said to have brought a cargo of rice.

The inhabitants of the La Plata provinces are subject to other alternations of climate, not less remarkable than those resulting from the actual presence or absence of rain. Northward of Buenos Ayres is a very marshy district; while south-westward is the giant chain of the Andes, separated only by the dry plains of the Pampas; and according as the wind blows from one or other of these quarters, the effects are most extraordinary. Sir Woodbine Parish, who resided for a considerable time at Buenos Ayres, noticed this subject particularly, and some of his details are highly instructive.

By the time the north wind reaches the city, it has become so overcharged with moisture, that everything is made damp; boots and books become mildewed; keys rust even in the pocket; and good fires are necessary to keep the apartments dry. Upon the bodily system the effect produced by this prevailing humidity is a general lassitude and relaxation, opening the pores of the skin, and inducing great liability to colds, sore throats, rheumatic affections, and all the consequences of checked perspiration. As a safeguard against the consequences of this state of things, the inhabitants wear woollen clothing, even if the weather be quite hot; and although Europeans would prefer wearing cool cotton clothing in such a climate, they soon learn that the native inhabitants are right in the plan they pursue. It is in the immediate vicinity of the river Plata that the effects are the worst.

In a former number (677) a notice was given of the hot and pestilential winds which sometimes visit the islands of the Mediterranean; but the damp wind of La Plata seems to affect the temper more than the constitution, and in so far differs somewhat from the "sirocco" of Malta. The irritability and ill-humour which this damp wind excites in some of the inhabitants amount to little less than a temporary derangement of their moral faculties. It is a common thing for men amongst the better classes to shut themselves up in their houses during its continuance, and lay aside all business till it has passed; whilst among the lower orders it is always remarked that cases of quarrelling and bloodshed are much more frequent during the north wind than at any other time. In short, everything is disarranged, and everybody lays the fault to one source—"Señor, es el viento norte."

A physician of many years' standing, who had closely studied the effects of this dreaded "viento norte," or north wind, on the animal system, gave Sir W. Parish the following account of an instance which had come under his personal notice:—"A man named Garcia was executed for murder. He was a person of some education, esteemed by those who knew him, and was in general rather remarkable than otherwise for the civility and amenity of his manners; his countenance was open and handsome, and his disposition frank and generous. But when the north wind set in, he appeared to lose all command of himself; and such was his extreme irritability, that during its continuance he could hardly speak to any one in the street without quarrelling. In a conversation with my informant, a few hours before his execution, he admitted that it was the third murder he had been guilty of, besides having been engaged in more than twenty fights with knives, in which he had both given and received many serious wounds; but, he observed, 'it was the north wind, and not he, that did it.' When he rose from his bed in the morning, he said, he was at once aware of its accursed influence over him; a dull headache first, and then a feeling of impatience at every thing about him, would cause him to take umbrage, even at the members of his own family, on the most trivial occurrence. If he went abroad, his headache generally became worse; a heavy weight seemed to hang over his temples; he sought objects, as it were, through a cloud; and was hardly conscious where he went. He was fond of play, and if in such a mood a gambling-house was in his way he seldom resisted the temptation; once there, any turn of ill-luck would so irritate him, that the chances were he would insult some of the by-standers. Those who knew him, perhaps, would bear with his ill-humours; but if unhappily he chanced to meet with a stranger

disposed to resent his abuse, they seldom parted without bloodshed. Such was the account the wretched man gave of himself, and it was corroborated afterwards by his relations and friends; who added, that no sooner had the cause of his excitement passed away, than he would deplore his weakness, and never rested till he had sought out and made his peace with those whom he had hurt or offended."

Many of the female inhabitants of the city, during the continuance of the "viento norte," may be seen walking through the streets with large split-beans stuck upon their temples; these are said to act as a slight blister, and to counteract the relaxation caused by the state of the atmosphere. It is found that during this period old wounds often burst out afresh; new ones are very difficult to heal; an apparently trivial sprain becomes at this period very serious; and lock-jaw from the most trifling accident is very frequent. In domestic matters, too, everything is out of sorts at such a time; the meat turns putrid, the milk curdles, and the bread becomes bad before it can be eaten.

But no sooner does the "pampero" succeed this "viento norte," than everything changes almost instantly. The pampero or south-west wind, blowing from the dry and snowy summits of the Andes, across the Pampas to Buenos Ayres, sweeps away the dreaded north wind and all its effects, and substitutes a dry healthy air in its place.

This pampero, however, is so violent, that it gives rise to other inconveniences; it becomes very little less than a hurricane, driving everything before it. Not unfrequently it is accompanied by clouds of dust from the parched plains, so dense as to produce almost total darkness; at which time instances have been known of bathers in the river being drowned before they could find their way to the shore. On one occasion the darkness resulting from one of these dust-clouds was such, that a gang of twenty convicts, who were working in irons upon the beach, made their escape from the guards, who could not see which way the men went. At such times as these day appears changed into night; and if rain should happen to fall, the dust-storm becomes converted into a mud-storm; for the dust is of an earthy rather than a sandy texture, and mixes with the water while in the air, thereby forming a pelting shower of mud.

A letter written in February, 1832, gives the following account of one of these pamperos and its effects, as experienced at Buenos Ayres:—"Yesterday we had another of those awful dust-storms which you have previously witnessed. It came on about a quarter past twelve o'clock. The rapidity of its approach, and awful opacity, alarmed the whole population; in an instant, as it were, there was a transition from the glaring ray of the meridian to the most intense darkness. Immense flocks, or rather one immense flight of birds immediately preceded it, and in fact, however incredible it may appear, commenced the obscurity by their numbers. The whole time of its duration was eleven minutes and a half, the total darkness eight minutes and a half, by watch, observed by Dr. S. and myself by candlelight; it was accompanied by loud claps of thunder, but not a ray of lightning was visible, although the thunder was by no means distant. After eleven minutes and a half the rain began to fall in very large black drops, which had the effect upon the white walls of making them appear, when the sun again showed itself, as if they had been stained or sprinkled with ink. I never witnessed a more majestic or awful phenomenon. The consternation was general; every one rushing into the nearest house, and all struggling to shut their doors on their neighbours."

What, therefore, with the damp and irritating effects of the "viento norte," the violence of the "pampero," the darkness of the dust-storm, the conversion of this dust-storm into a mud shower, and the occasional droughts, the inhabitants of these climates are exposed to vicissitudes which the weather of England, with all its apparently fickle changes, does not inflict on its inhabitants.

RAMBLES FROM RAILWAYS.

The Adur, Arun, and Wey.—No. VI.

From Pulborough, where we left the Arun, until it reaches Billinghurst, there is nothing that we need mention along its banks. We may therefore cross from Petworth at once to Billinghurst, by Wisborough-green, at which place there is a church on a hill, with a tall shingle spire, that will serve us for a long distance as a landmark. Here, as about most of the commons in this county, the parish cricketers may sometimes be seen; and every one who likes to look at a genuine English game, played in its best manner, will do well to observe Sussex cricketers wherever he may meet with them. Well-made, active men, with sinews hard as iron, yet supple as well-tempered steel, firm-handed, and lynx-eyed, they seem modelled for cricketers; and they are perhaps the most skilful cricketers in England. We do not mean the professional players, though the Sussex 'eleven' are probably more than a match for the 'eleven' of any other county, but the ordinary countrymen, whose enjoyment of the game is intense and hearty, and free from the sordidness of the professional hands.

Billinghurst is a pretty village, with a village church situated on rising ground—just such a rural church as an English landscape painter delights to paint. Then there is a comfortable public-house, where you may have a rasher of bacon cooked in true Sussex style—that is, by spreading some of the glowing wood-ashes upon the hearth, and then placing the said rasher on a gridiron over them; you thus get just a delicate smack of the woody flavour imparted to the bacon, and it is as neat a relish as a hungry walker can desire—Cobbett could not have wished for a better slice of bacon than may be got here.* But Cobbett was at Billinghurst, and we will see what he says about it, that we may say a few words about him. Our extract will aptly introduce a few remarks, as it is a fair sample of his style—we mean, of his mode of describing country places and manners, for we have nought to do here with his politics or political writings. "I got to Billinghurst," he writes, "to breakfast about seven o'clock. A very pretty village, and a very nice breakfast, in a very neat little parlour of a very decent public-house. The landlady sent her son to get me some cream, and he was just such a chap as I was at his age, and dressed just in the same sort of way, his main garment being a blue smock-frock, faded from wear, and mended with pieces of new stuff and, of course, not faded. The sight of this smock-frock brought to my mind many things very dear to me. This boy will, I dare say, perform his part at Billinghurst, or at some place not far from it. If accident had not taken me from a similar scene, how many villains and fools, who have been well teased and tormented, would have slept in peace at night and fearlessly swaggered about by day! When I look at this

* The reader may perhaps remember Cobbett's emphatic remark, that he who cannot eat fat bacon and drink milk for breakfast is only fit for a hospital. Cobbett in his 'Rural Rides' is continually referring to his baconian propensity—he stopped, for instance, at an inn at Ashurst, in this county, and was shocked to find there was no bacon: now, he says, "the want of bacon made me fear as to a bed;" so he set off, in the midst of a soaking rain, hoping to find more hospitable entertainment at the next village.



[Guildford Castle.]

little chap—at his smock-frock, his nailed shoes, and his clean, plain, and coarse shirt, I ask myself will anything, I wonder, ever send this chap across the ocean, to tackle the base, corrupt, perjured, Republican judges of Pennsylvania? Will this little, lively, but at the same time simple boy, ever become the terror of villains and hypocrites across the Atlantic?" and so on, for when he bursts out in a scolding vein, he does not stop in a hurry. Cobbett's influence as a political writer is, we suppose, now pretty nearly exhausted; but the book from which we have made the above and a preceding extract is one that is well worth reading. A solitary pedestrian or equestrian can hardly choose a pleasanter book for a companion through the counties it illustrates than Cobbett's 'Rural Rides in Surrey, Sussex, &c.' It is free, fresh, and hearty. The country breeze stirs every page of it. He wrote the letters which make up the volume while in the places they describe, and they are free from every taint of the "wen," as he oddly calls London. There is no trimming about them; they are straightforward, sturdy, and intensely characteristic. His enjoyment of the country is thorough, his observations on men and things are keen and shrewd; while alongside all runs a constant current of egotism of the most amusing kind. Nothing can check it, and everything else is influenced by it. In every picture it is in the foreground. There is too a sense of enjoyment about every part, that creates a feeling of enjoyment in the reader. But it must not be supposed that we agree with Cobbett's conclusions. We are as far from acquiescing in his decisions on scenery, or the beautiful, as we are in his notions on politics, religion, history, or literature. His prejudices are astounding, and generally in proportion to his ignorance; though that is the common case, for prejudices, as Joseph Glanvill says, "are the rattles of immature intellects; but the advanced reasons have outgrown them;" and with all his natural sagacity, and the really large amount of observation and information he had acquired, Cobbett remained in many things a dogged Hampshire peasant to the last. He saw clearly as far as he did see, but his circle of vision was not a very wide one; he saw all around distinctly enough, but the past and the future were in a mist, and all that belonged to them was either unseen or distorted beyond its proper size, and its connexion and sequence were lost. But with all his blunders and wild dislikings—and he *was* "a good hater"—the work we are speaking of will afford a rich fund of entertainment, and perhaps start some seasonable reflections; and it will certainly lead one who is passing over the ground it describes to notice a hundred things worth noticing, but which he would pass by unnoticed if he had not such a companion. Yet, as we said, we do not wish it to be thought that we agree with him as to the *beautiful* in the places he mentions. We have looked at most of the spots he dilates on as the most beautiful and we would not now go five yards out of our way to look at another because he praises it. His tastes are all of the *associative* kind. A flourishing scene is a beautiful scene. Well-tilled fields, clean corn, neat hedges, good roads, sound buildings, fat cattle—these make up his ideas of the beautiful. All his tastes are those of a farmer; yet there is in the expression of them a genuineness, a heartiness, that makes everything brighten under their influence.

From Billingshurst the river pursues a tortuous course towards Loxwood, near which place it quits the Arun navigation, which we are to follow, and winds away past Slinfold and Horsham to its source in St. Leonard's forest. The canal, connecting the Arun with the Wey, leaves Sussex about two miles beyond Loxwood, and joins the latter river about midway between Godalming and Guildford. It passes through a pleasant country, but as there is nothing to call for particular notice, we may at once cross over by Hascombe Hill, where are some traces of a Roman encampment, and a fine view, to Godalming, and there join the Wey, which is exceedingly pretty thereabout. Godalming is a long, quiet, and rather dull town, with

some old houses and an oldish church. In the church Manning, the historian of Surrey, to whom we have been somewhat indebted in this paper, and much more in that on the Mole, is interred. A singular circumstance is related to have occurred to him when at the University of Cambridge. He had a severe attack of small-pox, and was supposed to have died, and had actually been laid out for interment, when his father determined, as he said, to "give his son another chance," raised him up, and by the motion produced signs of life; proper means were resorted to, and he recovered. It was at Godalming that Mary Toft practised her strange deception, and more strangely managed to deceive some men who ought to have been wiser than to be so easily duped. She pretended to have been delivered of several live rabbits, and Mr. St. André, surgeon and anatomist to the royal household, published a pamphlet in support of her assertions, with engravings of the rabbits "taken from life." Hogarth issued a satirical print on the occasion, entitled 'Cunicularii, or the wise men of Godliman* in Consultation;' the principal figures are St. André and a Mr. Howard, a surgeon of Guildford, who acted a prominent part on the occasion. St. André was a quack, and not a very scrupulous personage, though he was no doubt deceived in this affair; but at least one physician of eminence in London supported her veracity besides him, and the tale was so generally credited that rabbits were for some time excluded from every dinner-table.

It would be too bad, as we have quoted from Cobbett, not to give his account of the road from Godalming to Guildford, though we do not mean to adopt it. "Everybody that has been from Godalming to Guildford knows that there is hardly another such a pretty four miles in England. The road is good; the soil is good; the houses are neat; the people are neat; the hills, the woods, the meadows, all are beautiful. Nothing wild and bold, to be sure, but exceedingly pretty; and it is almost impossible to ride along these four miles without feelings of pleasure, though you have rain for your companion, as it happened to be with me." We recommend the passage following this, about the valley of Chilworth, as a pretty sample of Cobbett's manner of running a tilt when anything brings to his mind Jews or Quakers, stockbrokers or Portuguese, Scotch *feelosophers*, or extreme unction, as he strangely names what he at other times more mildly calls the "infamous potato."

About a mile before reaching Guildford, on a high sandhill on the left of the road, and overlooking the river, are the ruins of St. Catherine's chapel, of which we give an engraving. They are in situation and appearance eminently picturesque, and the style of the architecture is somewhat graceful. It has been an elegant little building, but is now left to the bats and the owls. It appears to have been erected by Henry II., as a place of worship for the tenantry of his manor of Ertindon, after he had detached it from that of Godalming. Having fallen to decay, it was rebuilt in the twenty-ninth year of the reign of Edward I., by Richard de Wauncey, rector of St. Nicholas, Guildford. Some proceedings at law followed, to determine the right of the rector of St. Nicholas to hold it, and his tenure was declared to be illegal. At what time it fell into disuse and became ruinous is not known. A fair is held on the hill yearly. From the foot of St. Catherine's Hill, a short mile along the side of the Wey will bring us to Guildford, which being situated on irregular ground, with many large houses and two or three venerable churches, and the keep of the old castle overlooking all the rest, has a striking appear-

* This is the provincial mode of pronouncing Godalming.



[St. Catherine's Chapel.]

ance. Cobbett says, "The town of Guildford (taken with its environs) I, who have seen so many, many towns, think the prettiest, and, taken altogether, the most agreeable and most happy looking that I ever saw in my life. Here are hill and dale in endless variety. Here are the chalk and the sand, vieing with each other in making beautiful scenes. Here is a navigable river and fine meadows. Here are woods and downs. Here is something of everything but *fat marshes* and their skeleton-making agues." Guildford has the appearance of a place of business, but is said to be less flourishing than before the opening of the South-Western Railway. It has two or three buildings worth looking at, as perhaps are also the churches, but the only edifice we shall stay to mention is the castle. The keep, which is almost the only portion left, stands on the brow of a steep hill; it is square, and built of flints and rubble, with sandstone as dressings, and in triple rows alternately with flints. The external angles are faced with Caen stone. It is in tolerable preservation, though not sufficiently so to be of any service. Neither the name of its founder nor the date of its erection is known. King, in his 'Munimenta Antiqua,' vol. iii., has described it at length, and given views and groundplans of it; he states it to be of Saxon architecture, as indeed he does all square keeps, but it is now pretty generally agreed that the square keeps were rather characteristic of Norman castles. It is probably one of the best preserved of the early Norman keeps. We may just mention two or three of the most prominent circumstances connected with its history. In 1036 it was the scene of a sanguinary transaction. Harold, the son of Canute, by his first marriage, had taken possession of the throne, in violation of the settlement Canute made on his marriage with Emma of Normandy, by which the crown was to descend to her issue by Canute. Her son Edward first made an unsuccessful attempt to dispossess Harold of the throne; and afterwards, as Sir J. Mackintosh tells us, "his brother Alfred, having received a letter of invitation to renew the attempt, which purported to be from his mother, yielded to what he considered as promising a proposition. Alfred was the dupe of the forgery, which seems to have been a snare laid by Harold. He landed with a small body of six

hundred men, who, being taken prisoners in the night, were brought out on the next morning, and ranged in a line with their hands tied behind them. Sixty of them were enlarged, a few kept for slaves, the rest were destroyed, after being mutilated or dismembered, according to the capricious ferocity of the soldiers. Prince Alfred was soon after blinded, probably by burning out his eyes; an operation which, performed by such hands, was not likely to leave any need for the aid of an assassin." ('Hist. of England,' i. 63.) Godwin, Harold's chief minister, held the castle at this time, and was his agent in this affair; and he it was who decoyed Alfred here, and then so barbarously slaughtered his followers in the streets of Guildford. The prince was carried to Gillingham in Kent, where his eyes were put out; after this he was conveyed to Ely, where he died in the extremest agony, aggravated, it is said, by the hard fare and ill usage of his new gaolers, the monks of Ely. King John spent his Christmas here in 1201, in much splendour. According to Holinshed, he gave his servants many fine liveries, in which he was somewhat imprudently rivalled by the Archbishop of Canterbury, who was at the castle at the same time. "Each strove which should surpass the other in such sumptuous apparelling of their men; whereat the king (and not without good cause) was greatly moved to indignation against him, although for a time he concealed the same."

Guildford Castle was one of the places seized by the Dauphin Louis in his contest with John. In the reign of Edward I. it was converted into a prison. There used to be shown a large dungeon, but it is now bricked up. Among the eminent men born at Guildford was George Abbot, archbishop of Canterbury in the reigns of James I. and Charles I. He lived in eventful days, and his influence in the church was great and useful in checking the intolerance of Laud. But he is more remarkable for his personal history, and even his birth has something of the marvellous in it, if old Aubrey is to be trusted; not a very safe guide, we fear, in such a matter. According to him, Abbot's mother dreamt before his birth that if she were to catch a pike and eat it, the child would be a son who would rise to great dignity. This dream she related to her gossips, who only laughed at it; and she gave no further heed to the matter. A few days afterwards she went down to the river to get a bucket of water, and on drawing up the bucket was astonished to see that she had caught a pike in it. Remembering her dream, she immediately took it home, dressed it and eat it; and in process of time her son did come to the dignity we have mentioned.

THE DRIED FRUITS OF MALAGA.

THE southern parts of Spain produce a kind of grape which is particularly valuable to the cultivators; inasmuch as, when dried, it forms the favourite dried fruit known as *Malaga raisins*. There are only a few varieties of the fruit which can be thus treated, and only few climates and kinds of soil fitted for their growth. It is at and near Malaga that this agricultural produce flourishes; and this city is within a few miles of the Mediterranean, so as to enjoy all the advantages of a southern climate.

A few years ago Mr. Busby, who has written a work on the subject, travelled from Seville to Malaga with a view of inquiring into this branch of industrial produce. This is a distance of a hundred and thirty miles, Malaga lying south-east of Seville; and the intervening district sufficiently illustrates the sad effects of the state of anarchy into which this fine country has been so long plunged. When, however, Mr. Busby arrived nearer to the raisin district of Malaga, he found a more cheering sight:—"Instead of the rich and extensive plains, bounded by gently rising hills covered with the pine, the road here wound through a continuation of steep rocks and hills, in many places approaching in character to mountains. But here the hand of industry had been at work, and, instead of a track formed by the successive marks of wheels, there was a road cut out of the side of the hills, and winding through them with considerable art. Here and there, also, where a favourable spot was presented, a peasant had established himself; and the plantations of vines and olives with which his industry had surrounded his habitation, had given to the narrow valleys and steep declivities of the mountains an appearance of cultivation and fertility that might be looked for in vain in the wide-spreading and rich valleys through which we had previously passed. As we approached Malaga these plantations became frequent, although the country only presents a succession of steep hills."

The soil on which the grapes are grown is a loose brown loam, plentifully mixed with the gravel of the strata beneath, which is a bluish grey slate, turning brown and falling to pieces on exposure to the atmosphere. In many places there are five or six feet in depth of this loose soil, before meeting with more solid material. In preparing the ground for planting, the planters do not trench the whole of the ground, but dig out square holes about two feet across, and nearly the same in depth. The distance of the centres of these holes from each other is seven feet; a distance which seems universal at Malaga as that at which the single vines are planted apart. The vineyards are never manured, as the planters say it would give more wood, without adding to the quantity of the fruit. The number of shoots to each vine is from ten to twenty; and, as no attempt is made to prop them up, almost every bunch of grapes lies on the ground,—so little care is required in the cultivation. Four or five of these vines, of the best specimens, will yield a twenty-five pound box of raisins, or three times this weight of the undried juicy fruit; but the average of the whole is said to be about seven or eight pounds of the fresh fruit, or two pounds and a half of dried raisins, from each vine. Although two-thirds of the weight and substance of the grape are lost in the drying, yet, as the grapes when dried are worth double what they would yield if made into wine, the planters rarely think it worth their while to make wine, but appropriate nearly all their fruit to the making of raisins.

We may here notice the difference between the kinds of Malaga raisins. These kinds are, first, the *Muscatel*; second, the *Bloom* or *Sun* raisins; and third, the *Lexias*. The Muscatel raisin of Malaga is deemed the finest in the world: the grape which produces them can only be grown within two or three miles of the coast; those grown farther inland being of inferior quality. The district in the vicinity of Malaga where they are grown is not above twenty miles in length; and the vineyards thereabout are the choicest of any. The grapes are dried by the heat of the sun, and when thus converted into raisins, they are packed in boxes containing twenty-five pounds, and into half and quarter boxes; the box of twenty-five pounds being worth to the grower about forty rials on an average, equal to about fourpence per pound. The second kind, the *Bloom* or *Sun* raisin, is prepared from a very oblong grape, called by the planters the *Uva Larga*; these grapes are dried in the sun like the former. The best of these, called "bunch raisins," are generally packed in boxes; while the more inferior kind, separated from their stalks, are packed in casks. The Blooms keep better than the Muscatels, and for that reason are

exported in large quantities to India. The third kind, *Lexias*, are made from grapes grown further inland, inferior in quality to both the others; the raisins receive this distinctive name from a liquor or ley into which they are dipped before exposure to the sun, and which consists of water, ashes, and oil.

In preparing the muscatels, the gathering of the grapes commences about the middle of August, such bunches only being chosen as are ripe. The gatherers return after a week or two to make another selection; and so on for a third or fourth time. A place is always reserved in the vineyards, free from plants, on which to spread the grapes when gathered; and the spot thus selected is such as has a soil of a dark colour, in order that it may retain the full force of the sun's rays during the day, and a considerable portion of heat during the night. The branches are here spread out separately on the ground, and never allowed to press upon each other. At the end of about a fortnight they are generally dried, having been turned over once or twice during the time. Sometimes, if the autumnal rains come on earlier than usual, the planters have wooden *toldos*, or awnings, to shelter the grapes during rain, and also to shield them from the dews of the night, which retard the drying very much.

The grapes are carefully sorted before being laid out to dry: the small ones being picked out, as well as any which may happen to be injured; and when the grapes are turned, any which may happen to have become spoiled are picked out, and either dried for an inferior kind of raisin, or appropriated in some other way. The time at which the grapes have become sufficiently dried to constitute raisins seems to be judged rather by the eye and the finger than by any prescribed rule. The relative value of the raisins is thus stated:—That when Muscatels are worth about sixteen rials for ten pounds, Blooms are worth twelve and Lexias about three rials for a like quantity. The vine-producing districts are measured by the *fanega*, a quantity rather smaller than the English acre, in the proportion of twelve to thirteen. Each fanega contains usually six hundred and fifty vines; and an English acre produces something above two thousand pounds of dried raisins in a year.

There is one part of France where raisins are prepared as an article of commerce; but inferior in quality to those of Malaga. The district is near Marseille, and is said to be very remarkable as an instance of well-directed industry. The road from Marseille to Roquevaire proceeds everywhere among steep declivities and rugged rocks; but in every available spot the planter has secured for himself fruitful produce. The fruit is made from the Pause or Passe, a largish white grape with a fine skin; the bunches are often very large, but the grapes are reduced to one-fourth of their original bulk in the process of drying. The second quality of raisin is from a grape called the Arignan, and are equal to the former in quality, though smaller in size. The third quality consists of the smaller and loose grapes of the two former. Most of the raisins are packed in boxes containing twelve, twenty-five, or fifty pounds each; and between every two inches in thickness of grapes is inserted a sheet of white paper. All these raisins are prepared by the method adopted at Malaga for the Lexias, that is, by steeping before drying.

During the continental war, when the exportation of raisins from Malaga was placed under great difficulties, the neighbourhood of Marseille was busily employed in making up the deficiency; but on the return of peace the trade renewed its old channel, and has ever since retained it,—a proof that Malaga, in respect either to its climate, its soil, or some other circumstances, is the most favourable spot for this kind of produce. That there are peculiarities which affect the quality of the produce is abundantly clear, both with reference to raisins, to figs, and other fruits. There is a district of France, for instance, near that to which we have just alluded, where figs are dried in large quantity. The flat form which most of them have is given to them in the boxes, each fig being pressed separately into the box.

The vessels in which the fruits from Malaga are exported to England, America, and other countries, sail generally during the months of September and October; and the number of these will give an idea of the foreign commerce of the place. In one year there were thirty-six ship loads of fruits sent off to England, thirty to the United States, twelve to Hamburgh, eleven to France, eight to Holland, five to Denmark, and about a dozen to other places. In some years the quantity sent to England has been greater than to all other countries put together. Of these ship-loads a notable proportion consists of raisins, in barrels, boxes, and frails; while the other fruits are grapes, figs, almonds, oranges, lemons, and pomegranates.

THE SUGAR-MAKING EXCURSION.

[From 'Mind amongst the Spindles,' a selection from the 'Lowell Offering, written by the Factory Girls at Lowell, and forming one of 'Knight's Weekly Volumes.' The following tale is here given as an exact account of an interesting process, and as affording a good specimen of American country-life.]

It was on a beautiful morning in the month of March (one of those mornings so exhilarating that they make even age and decrepitude long for a ramble), that friend H. called to invite me to visit his sugar-lot—as he called it—in company with the party which, in the preceding summer, visited Moose Mountain upon the whortleberry excursion. It was with the pleasure generally experienced in revisiting former scenes, in quest of novelty and to revive impressions and friendships, that our party set out for this visit to Moose Mountain.

A pleasant sleigh-ride of four or five miles brought us safely to the domicile of friend H., who had reached home an hour previously, and was prepared to pilot us to his sugar-camp. "Before we go," said he, "you must come and all step within doors, and warm your stomachs with some gingered cider." We complied with his request, and after a little social chat with Mrs. H., who welcomed us with a cordiality not to be surpassed, and expressed many a kind wish that we might spend the day agreeably, we made for the sugar-camp, preceded by friend H., who walked by the side of his sleigh, which appeared to be well loaded, and which he steadied with the greatest care at every uneven place in the path.

Arrived at the camp, we found two huge iron kettles suspended on a pole, which was supported by crotched stakes driven in the ground, and each half full of boiling syrup. This was made by boiling down the sap, which was gathered from troughs that were placed under spouts which were driven into rock-maple trees, an incision being first made in the tree with an auger. Friend H. told us that it had taken more than two barrels of sap to make what syrup each kettle contained. A steady fire of oak bark was burning underneath the kettles, and the boys and girls, friend H.'s sons and daughters, were busily engaged in stirring the syrup, replenishing the fire, &c.

Abigail, the eldest daughter, went to her father's sleigh, and taking out a large rundlet, which might contain two or three gallons, poured the contents into a couple of pails. This we perceived was milk, and as she raised one of the pails to empty the contents into

the kettles, her father called out, "Ho, Abigail! has thee strained the milk?" "Yes, father," said Abigail.

"Well," said friend H. with a chuckle, "Abigail understands what she is about, as well as her mother would; and I'll warrant Hannah to make better maple-sugar than any other woman in New England, or in the whole United States—and you will agree with me in that, after that sugar is turned off and cooled." Abigail turned to her work, emptied her milk into the kettles, and then stirred their contents well together, and put some bark on the fire.

"Come, Jemima," said Henry L., "let us try to assist Abigail a little, and perhaps we shall learn to make sugar ourselves; and who knows but what she will give us a 'gob' to carry home as a specimen to show our friends; and besides, it is possible that we may have to make sugar ourselves at some time or other; and even if we do not, it will never do us any harm to know how the thing is done." Abigail furnished us each with a large brass scummer, and instructed us to take off the scum as it arose, and put it into the pails; and Henry called two others of our party to come and hold the pails.

"But tell me, Abigail," said Henry, with a roguish leer, "was that milk really intended for whitening the sugar?"

"Yes," said Abigail, with all the simplicity of a Quakeress, "for thee must know that the milk will all rise in a scum, and with it every particle of dirt or dust which may have found its way into the kettles."

Abigail made a second visit to her father's sleigh, accompanied by her little brother, and brought from thence a large tin baker, and placed it before the fire. Her brother brought a peck measure two-thirds full of potatoes, which Abigail put into the baker, and leaving them to their fate, returned to the sleigh, and with her brother's assistance carried several parcels, neatly done up in white napkins, into a little log hut of some fifteen feet square, with a shed roof made of slabs. We began to fancy that we were to have an Irish lunch. Henry took a sly peep into the hut when we first arrived, and he declared that there was nothing inside, save some squared logs, which were placed back against the walls, and which he supposed were intended for seats. But he was mistaken in thinking that seats were every convenience which the building contained,—as will presently be shown.

Abigail and her brother had been absent something like half an hour, and friend H. had in the mean time busied himself in gathering sap, and putting it in some barrels hard by. The kettles were clear from scum, and their contents were bubbling like soup. The fire was burning cheerfully, the company all chatting merrily, and a peep into the baker told that the potatoes were cooked.

Abigail and her brother came, and taking up the baker, carried it inside the building, but soon returned, and placed it again before the fire. Then she called to her father, who came and invited us to go and take dinner.

We obeyed the summons; but how were we surprised when we saw how neatly arranged was every thing! The walls of the building were ceiled around with boards, and side tables fastened to them, which could be raised or let down at pleasure, being but pieces of boards fastened with leather hinges, and a prop underneath. The tables were covered with napkins, white as the driven snow, and loaded with cold ham, neat's tongue, pickles, bread, apple-sauce, preserves, dough-nuts, butter, cheese, and potatoes—without which a Yankee dinner is never complete. For beverage, there was chocolate, which was made over a fire in the building—there being a rock chimney in one corner. "Now, neighbours," said friend H., "if you will but seat yourselves on these squared logs, and put up with these rude accommodations, you will do me a favour. We might have had our dinner at the house, but I thought that it would be a novelty, and afford more amusement to have it in this little hut, which I built to shelter us from what stormy weather we might have in the season of making sugar."

We arranged ourselves around the room, and right merry were we, for friend H.'s lively chat did not suffer us to be otherwise. He recapitulated to us the manner of his life while a bachelor; the many bear-fights which he had had; told us how many bears he had killed; how a she-bear denned in his rock dwelling the first winter after he commenced clearing his land—he having returned home to his father's to attend school; how, when he returned in the spring, he killed her two cubs, and afterwards the old bear, and made his Hannah a present of their skins to make a muff and tippet; also his courtship, marriage, &c.

In the midst of dinner, Abigail came in with some hot mince-pies, which had been heating in the baker before the fire out of doors, and which said much in praise of Mrs. H.'s cookery.

We had finished eating, and were chatting as merrily as might be, when one of the little boys called from without, "Father, the sugar has grained." We immediately went out, and found one of the boys stirring some sugar in a bowl, to cool it. The fire was raked from beneath the kettles, and Abigail and her eldest brother were stirring their contents with all haste. Friend H. put a pole within the bail of one of the kettles, and raised it up, which enabled two of the company to take the other down, and having placed it in the snow, they assisted friend H. to take down the other; and while we lent a helping hand to stir and cool the sugar, friend H.'s children ate their dinners, cleared away the tables, put what fragments were left into their father's sleigh, together with the dinner-dishes, tin baker, rundlet, and the pails of scum, which were to be carried home for the swine. A firkin was also put into the sleigh; and after the sugar was sufficiently cool, it was put into the firkin, and covered up with great care.

After this we spent a short time promenading around the rock-maple grove, if leafless trees can be called a grove. A large sap-trough, which was very neatly made, struck my fancy, and friend H. said he would make me a present of it for a cradle. This afforded a subject for mirth. Friend H. said that we must not ridicule the idea of having sap-troughs for cradles; for that was touching quality, as his eldest child had been rocked many an hour in a sap-trough, beneath the shade of a tree, while his wife sat beside it knitting, and he was hard by, hoeing corn.

Soon we were on our way to friend H.'s house, which we all reached in safety; and where we spent an agreeable evening, eating maple sugar, apples, beech-nuts, &c. We also had tea about eight o'clock, which was accompanied by every desirable luxury—after which we started for home.

As we were about taking leave, Abigail made each of us a present of a cake of sugar, which was cooled in a tin heart.—"Heigh ho!" said Henry L., "how lucky! We have had an agreeable visit, a bountiful feast—have learned how to make sugar, and have all got sweethearts!"

We went home, blessing our stars and the hospitality of our quaker friends.

I cannot close without telling the reader, that the sugar which was that day made, was nearly as white as loaf-sugar, and tasted much better.

JEMIMA.

A SECOND DAY AT THE TYNE FACTORIES.



[Stephenson's Locomotive Factory, Newcastle on-Tyne.]

Stephenson's Locomotive Factory.

WHEN Mr. George Stephenson was examined before the Committee of the House of Commons, on the Liverpool and Manchester Railway Bill, in 1825, his evidence was such as would excite as much surprise now as it did then; but from a very different reason: his examiners then marvelled at his boldness of prediction; while we at the present day should be much more disposed to wonder at his timidity. He was asked whether the locomotive could travel safely at the rate of five or six miles per hour; and in answer he stated, that he thought even double that rate might be attained. He also stated that he proposed to travel at the rate of eight miles per hour with a burden of twenty tons, and four miles an hour with forty tons:—statements which were laughed at by some parties, and positively disbelieved by others.

What a change has the intervening period of nineteen years effected! How cruelly do third-class passengers now think themselves used if they are whirled along at *only* fifteen or twenty miles an hour; and how many "Letters to the Editor," of some one or other of the Journals, are there, urging that nothing but a competing line will cure the barbarous slowness of Railway Directors. Sam Weller's respectable parent hurled his indignation at the locomotives as they were seven or eight years ago; but they have at the present day much more to answer for. Those which used to effect twenty miles within the hour now accomplish twenty-five or thirty; the fifty miles between London and Brighton are now accomplished by some of the trains in an hour and a half; the Norwich and Brandon Company are having locomotives built which will cover forty miles in the hour; while on a recent important occasion at Windsor, the Duke of Wellington and others of the Cabinet Ministers came from Slough to Paddington at the rate of seventy miles an hour! And yet with all this, the atmospheric principle of traction is put forth as a formidable antagonist, on the ground (among others) that it will be *quicker* than the locomotive system! The truth is, we are travelling so quickly that we have not time to look behind us to see how great is the path of improvement over which we have passed in the last twenty years.

These few remarks are called forth by the associations connected with the Locomotive Factory, of the interior of which our frontispiece gives a sketch, and which has been linked, more perhaps than any other factory in the kingdom, with the progress of the railway system. Newcastle, among its busy centres of industry, contains some large engineering establishments where steam-engines and machinery are produced. The one belonging to Messrs. Robert Stephenson and Co. has been and still is peculiarly (though not wholly) directed to the construction of locomotives, of which a vast number have been here made. The locality has much to do with this matter; indeed it may be said that the Newcastle collieries originated the locomotive; for the two Stephensons, father and son, now so eminent in the highest class of civil engineering, were once colliery engineers, and tested both the railway system and the locomotive system at the Newcastle collieries, before either the one or the other were applied to passenger-traffic.

This factory is situated in the western part of Newcastle, on the summit of the steep bank which forms the northern shore of the Tyne, and near the spot where

there will probably be ere long a railway viaduct to cross the Tyne at a vast elevation. It is like all other engineering factories in its general features; having open yards surrounded by buildings, and having in those buildings numerous workshops devoted to the several departments of the manufacture. The parts of a locomotive engine are so numerous, and so different in their form and materials; the introduction of new improvements in every part is so rapid; and the mutual adjustment and fitness of one part to another so necessary, that an engine-factory comprises within itself many different factories or branches of manufacture, all bearing on one point. There are, however, certain broad distinctions which serve to indicate the general character of the operations. First, there is the rough material, iron, steel, copper, or brass, in the form of sheets, bars, and rods; and then implements and processes whereby these are wrought up into usable form, such as those connected with rolling, drawing, casting, boring, turning, planing, drilling, cutting, filing, polishing, and other mechanical operations. However varied may be the appearance of the engines produced at such factories, yet it is by modifications of the processes here enumerated that they are all produced, the skill of the workmen adapting the practical details to the purpose to which the engine is to be applied.

It is impossible to look at the locomotives standing in the lower buildings of this factory—some nearly in a finished state, others in various stages of preparation, and all collectively employing the services of several hundred workmen—without thinking of the steady but incessant steps by which the present state of excellence has been attained in this department of manufacture. It may be interesting to glance rapidly at a few features in this movement, and to see what a locomotive at the present day really is.

Just forty years ago, Mr. Trevethick, a mining engineer, constructed the first locomotive engine, and applied it successfully to the traction of coal and ore at Merthyr Tydvil, in Wales. The idea was to apply it to common roads; but this was given up, and its use was confined to the tramways at the iron and coal works. In the very first trial it drew several carriages, containing ten tons of iron, the distance being nine miles, and the rate of travelling five miles an hour. When it became proposed to extend this system to other railways, a curious imaginary difficulty started: an objection was raised in theory, which has not been found to be operative in practice. It was supposed that the amount of adhesion between the wheels and the rail would be so small, that the wheels would slip along the rail instead of moving only by revolving on the axis. A cure for the disease was then sought for, before the disease itself had been proved to exist. Messrs. Trevethick and Vivian proposed to make the external rims of the wheels rough and uneven, either by surrounding them with projecting heads of nails or bolts, or by cutting transverse grooves in them, or by some other analogous contrivance. In 1811, a second locomotive was made by Mr. Blenkinsopp, of Middleton Colliery, near Leeds, on a very curious plan; the rails themselves, instead of being smooth bars, presented a line of projecting teeth like those of a cog-wheel; and the wheels were furnished with corresponding teeth, which worked between those of the rail; thus having a rather complicated means of avoiding the so much dreaded slipping. In the following year Mr. Chapman contrived a locomotive in which a chain, passing along the middle of the railway, coiled once round a grooved wheel beneath the engine, as a means of preventing the wheels from slipping round instead of progressing. The next following year (1813) witnessed the production of a most singular contrivance; in which a pair of mechanical feet and legs were made to *walk* along in such a manner as to propel the carriage, and prevent the wheels from slipping round; the arrangement was highly ingenious, but superfluous for the object in view.

Whether engineers had not entertained the idea, or did not possess the means, of determining the point, certain it is that it was not till about 1814 that experiments were made to prove that, if the road be pretty level and the rails clean, there is sufficient adhesion between the wheels and the rails to enable the former to progress without slipping. This settled the matter, and a great deal of complicated arrangement was thus effectually got rid of. The mode of connecting the moving power with the wheels, and the position which the cylinder or cylinders occupied in the engine, were next the subject of attention, and numerous modifications of arrangement were successively introduced.

The next and greatest means of improvement was the opening of the Liverpool and Manchester Railway, perhaps the greatest event which the world has ever yet seen in relation to land travelling. The particulars of this undertaking were given in one of our early volumes, and a few words on the matter, therefore, will suffice here. When the directors, after much consideration and many preliminary inquiries, decided to use locomotives, instead of either fixed engines or horse power, they offered a reward to the owners of the best engine which should enter the lists in a public trial. Accordingly, in 1829, three engines, the Rocket, the Novelty, and the Sanspareil, started for the prize; the conditions being, that the engine should pass over a portion of the line of railway a mile and a half in length, ten times in each direction, making thirty miles in all; with certain restrictions as to weight, fuel, speed, &c. The Sanspareil and the Novelty both met with accidents in the course of the trial, which put them "hors de combat;" and the prize was awarded to Messrs. Stephenson, as the engineers of the Rocket. This engine, at the quickest rate, went at twenty-seven miles an hour, and at the slowest about eleven.

This Rocket, excellent as was its construction relatively to those which preceded it, was a very different engine from those of our own day. Instead of having the cylinders horizontal, it had them inclining obliquely downward from front to back. Instead of having them enclosed within a metallic case or receptacle, they were placed outside the engine, exposed to the cold of the atmosphere. Instead of six wheels, it had four. But it resembled in principle those of modern times in having a tubular boiler, by which a larger surface of water is exposed to the fire than under the older arrangement, and thereby a more rapid generation of steam produced. Since the day when the Liverpool and Manchester Railway opened, and when the locomotive engine showed its wondrous power by travelling at the rate of more than thirty miles an hour (while conveying the wounded body of Mr. Huskisson back to Manchester), there has probably not been a single important part of the engine but what has been subjected to improvements in some form or other. Without attempting the almost endless task of describing the minute details of structure, we may briefly explain how one of these moving masses derives its almost arrow-like speed.

There are two main objects to be attained:—*First*, to generate the steam which is to do the work; and next, to apply the steam thus generated to the revolution of the wheels; and the parts of the engine are thus conveniently divided into two groups. In the first place, there are the fire and boiler. The fire-place or fire-box is a double receptacle placed at the lower part of the hinder end of the engine; it consists in fact of one box within another, a vacant space of three or

four inches between the two being filled with water. The outer fire-box is made of wrought-iron plates, and the inner one generally of copper, but sometimes of iron. The bottom of both boxes is formed of a grate of bars, through which the ashes fall either to the ground or into an ash-pit placed below them.

The boiler, which contains the water to be heated by the fire in the fire-box, is a cylinder seven or eight feet long by three or four in diameter, made of very strong wrought-iron plates, and covered on the outside by a casing of wood intended to prevent the heat from radiating too rapidly into the open air. The hinder end of the boiler fits to the front side of the outer fire-box, so as to form a communication between the water in the boiler and that between the two fire-boxes.

The mode in which the gases and heated air (for there is no smoke from the coke fuel), after having heated the water, escapes to the funnel or chimney, is one of the most curious features in a modern locomotive, and one to which it owes no small portion of its efficacy. The water in the boiler is not *over* the fire, but in *front* of it, and therefore might seem at first thought to be peculiarly ill fitted to receive the heating power from the fire; but this is brought about by the same agency which conveys the gaseous products of combustion to the funnel in front of the engine. There are upwards of a hundred brass tubes extending from end to end of the boiler, having connection with the inner fire-box at one end, and with the chimney or a receptacle called the smoke-box at the other. These tubes are about an inch and a half in diameter, and are made of rolled brass, the distance between them as they lie being less than an inch.

Let us see, then, how these tubes assist the object in view. Through an oval hole in the fire-box, behind, the fire is lighted; and through a convenient inlet the boiler is filled or nearly filled with water. As the fire-box becomes filled with flame, gas, and heated air, these products find a passage through the hundred or hundred and twenty horizontal tubes, and escape into the smoke-box in front. But as the boiler is filled with water, the exteriors of all these tubes are in contact with the water, and give out heat with so much rapidity as to raise the water to the boiling temperature in an exceedingly short space of time. This is the grand object, to attain which the engineer will willingly incur the extra cost entailed by these tubes. The first locomotives had merely a large flue passing from the fire-place to the chimney; but to have a sufficiently large heating surface under this arrangement would require such large and weighty apparatus that it would be inconsistent with the high velocity at which the engines are intended to move. Accordingly Mr. Stephenson, in planning the Rocket engine, used twenty-four tubes of three inches' diameter, instead of a large flue. Under the old form a speed of eight miles an hour was the utmost that could be attained; but this tubular boiler gave such widely different results, that they have been since used almost if not quite universally. By degrees the diameter of the tubes was lessened and their number increased, until at length as many as a hundred and twenty have been adopted. They were at first made of copper, but as these became worn away in three or four months when in regular use, they have been superseded by brass tubes, which last about two years. Every tube is said to be worth about a guinea, so that the re-tubing of an engine becomes an expensive affair.

The heated air passes into a wrought-iron smoke-box in front of the engine, and from thence up the chimney. In order to drive it violently up the chimney, and thus produce a powerful, "draught" in the fire, the waste steam is allowed to rush up the chimney with it, and carry it quickly up.

We have now to see what results from the heated water in the boiler. The steam from the water ascends to the top of a kind of hollow dome, about two feet high above the boiler, and in so doing parts with some of the water which by agitation and shaking had become mixed with it; it then descends a pipe within the dome, and passes along a large steam-pipe to the front of the engine; here it divides into two parts, and descends to supply steam to the two cylinders placed at the front extremity of the lower part of the engine. Each of these cylinders is a cast-iron vessel about a foot in diameter, placed horizontally, and having a solid piston, or plunger, working from end to end within it. Numerous minor pieces of apparatus of great complexity and delicacy are placed near these cylinders, to regulate the entrance of steam into them, and its exit when the required office is performed. The steam drives the piston to and fro, and the piston, through the medium of a rod, turns one of the large wheels, by which the whole machine is impelled. Supposing the piston to be at any moment near the front end of the cylinder, steam is admitted in front of it into the cylinder, through an appropriate opening; and its elastic force drives the piston rapidly to the hinder end of the cylinder; the steam then escapes, and another body of steam, entering behind the piston, drives it forward again; this in its turn escapes, and thus a series of alternate movements arise. When we hear the puffs, or apparently laboured breathings of the engine, these are the successive escapings of the steam from the cylinders into the chimney, and from thence into the open air. A cylinder-full of steam is sent forth at each puff, and the driving-wheel is sent round half a revolution. There are two cylinders, one on each side, and it is so arranged that they send out their puffs of steam alternately; every puff, therefore, heard while the engine is moving onwards, is equivalent to one quarter of a revolution of the driving-wheels; and the rapidity of the puffs, taken in conjunction with the diameter of wheels, affords the means of estimating roughly the speed of the engine. The following calculation by Dr. Lardner might give to a railway traveller data for measuring his speed:—"If the driving-wheels be five feet in diameter, their circumference will be fifteen feet, seven inches. To drive a train with a velocity of thirty miles an hour, it will be necessary that the engine should be propelled through a space of forty-five feet per second. To accomplish this with five-feet wheels, they must be therefore made to revolve at the rate of very nearly three revolutions per second; and as each revolution requires two motions of the piston in the cylinder, it follows that each piston must move three times forwards and three times backwards in the cylinder in a second; that steam must be admitted six times per second from the steam-chest to each cylinder, and discharged six times per second from each cylinder into the blast-pipe. The motion therefore of each piston, supposing it to be uniform, must divide a second into six equal parts; and the puffs of the blast-pipe in the chimney must divide a second into twelve equal parts." We may sum it up thus: if we hear on an average eight puffs in a second, the engine is travelling about twenty miles an hour; if ten, twenty-five miles; and if twelve, thirty miles.

These are the broad principles of the locomotive. The mode of supplying coke and water from the tender behind; the arrangements for governing the heat of the fire; the admission of steam to the cylinder, and the exit of superfluous steam and condensed steam; the safety-valve; the shrill whistle, produced by allowing a current of steam to strike upon a thin metallic edge; the gauges to indicate the state of the water and of the steam in the boiler—all display the highest ingenuity, and are well worthy of the attention of those

fragments, and the whole together forms a paste. When the manufacturer wishes to obtain "cold-drawn" oil, he at once exposes this pasty mass to the action of the



[Grinding the Linseed.]

press, by which oil of very fine quality, but in very limited quantity, is obtained. To obtain the main supply, the paste is heated before being exposed to the press. The heating is effected in different modes in different mills. In some cases there is a small fire-place situated in the corner of the building, and heated by burning charcoal. The seed is contained in a circular copper pan, which is set over the fire, and a stirrer is so adjusted as to keep the seed in motion while being heated. When the seed is sufficiently heated, a door or sluice is opened, and the seed is drawn out into a number of oblong flannel bags, as shown in the cut. In more modern contrivances the seed is heated by steam, instead of by a charcoal fire; but in both cases the seed is kept constantly stirred while being heated, and is drawn out when heated into the bags which contain it while undergoing pressure.

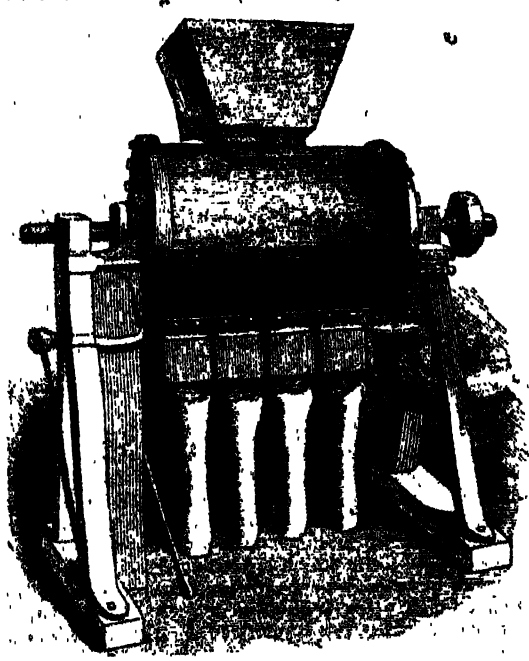
In one of the buildings is a range of hydraulic presses capable of exerting an immense pressure. The bags of seed are flattened slightly with the hand, and piled up one on another in cast-iron cases, which are placed in the press as here sketched. The force is then laid



[Bags of Linseed in the Hydraulic Press.]

on, and in a few seconds we see the oil oozing from every pore in the bags, and running down into convenient receptacles beneath. When as much oil is obtained by this pressure as the seed in this form will yield, the pressure is removed, the bags are taken out, and then stripped off the seed, which has by this time assumed the form of a flat, hard, solid cake. This cake is again ground, again heated, and again pressed, by which a further portion of oil is extracted from it.

When the bags are for the last time stripped from the seed (an operation which is facilitated by a simple piece of apparatus sketched in the next cut), the latter present almost the hardness and solidity of a board. They are trimmed and brought into a regular form fit for packing, and are then sold as *oil-cake*. This cake is a valuable article to agriculturists, and has at times been sold at a high price; it is employed in the fattening of cattle, sheep, and other animals, for which it seems fitted by the oil which it still contains, and which could not be wholly removed by pressure. It is usually given to the animal mixed with some other sort of food, such as hay or cut chaff. On the Continent linseed-cake is sometimes given in a liquid state, being diffused in hot water, and given to the animals to drink, hay and other food being given at the same time. Much controversy has arisen among agriculturists and graziers as to the precise value of this kind of fattening food in reference both to the condition of the animals when fed on it, and the manure resulting from the system, but the result seems to be very much influenced by the price at which the cake can be purchased.



[Crushed Linseed falling into bags.]



[Stripping the Bag from the Oil-cake.]

When the cake is so dry as not to leave enough nourishment for fattening cattle, it is occasionally used as manure; in which case the cake is reduced to powder, and is sown by hand on ground intended for wheat, barley, or turnips; being harrowed in with the seed, and used at the rate of from three to six quarters per acre. It is rape-cake that is thus used, linseed-cake being generally too costly.

The oil, as expressed from the seed, requires very little more attention. It is transferred from the vessels into which it falls, into casks and other receptacles, and is then ready to be applied to some one or other of the numerous purposes for which it is fitted. It is principally as a vehicle for mixing oil-paints that it is used; but there are innumerable branches of the manufacturing arts in which it is extensively employed. Many medicinal preparations, too, derive a portion of their value from the presence of this oil, in a more or less refined or purified state. Linseed-oil, in its usual form, is essentially what is termed a "fat" or unctuous oil, possessing a property which renders it very slow in drying. To remedy this, which for some purposes would be a great inconvenience, a small portion of the oil made is converted into "drying" oil, whose distinctive quality is indicated by its name. The drying quality is imparted to the oil by boiling it with sugar of lead, white vitriol, red lead, or some one of a rather numerous list of substances. Common drying oil is often made by boiling linseed-oil with red lead; but the finest kinds are produced by some finer agent, sometimes one or other of the gums.

One department of this mill is devoted to the preparation of *turpentine* in the form which it usually assumes in the manufacturing arts. The common turpentine of commerce is imported into this country chiefly from Canada and the United States, in barrels or casks. When these barrels are opened, the turpentine appears as a stiff, adhesive, honey-like paste, midway between the solid and the fluid state. It consists of two very different component parts: a clear transparent liquid, which forms the "oil of turpentine," or "essence of turpentine," of commerce; and a yellowish or brownish solid, forming common resin; and it is the object of the turpentine-distillery carried on at these works to separate these two component ingredients.

In one of the buildings is a large still, together with numerous vessels, and other apparatus, having for object the separation of the liquid from the solid components. Most readers are probably aware that in all processes of distillation the substance to be distilled is exposed to heat in a close vessel, and raised to such a temperature as will vaporize some of the component ingredients without affecting the others, and thus separating one from another. In the common distillation of spirit, for example, a fermented liquor, called "wash," is exposed to such a heat that the spirituous or alcoholic portion is caused to rise into vapour, leaving the greater part of the water and nearly all the other ingredients behind; and by the subsequent condensation of this vapour, liquid spirit is obtained. So it is with turpentine. The liquid or spirituous portion vaporizes at a much lower temperature than the solid or resinous; and therefore, while the resin settles at the bottom of the still in a solid form, the spirit rises in the form of vapour, and passes through a refrigerator or cooling-vessel, whereby it is brought to the liquid form. The temperature to which the still is raised, and the general arrangement of the apparatus, depend on the nature of the substance to be distilled, and are among the minuter objects of the manufacturer's skill. The "black" resin and the "yellow" resin of the shops are produced in the same way, but from different kinds of turpentine.

Starch-Factory.

We may extend our visit a little further east, and devote a few paragraphs to a notice of the operations carried on at a starch-factory in North Shields. The building is neither so large nor the operations so complex as in many instances which have engaged our attention; but the chemical transformations connected with this branch of manufacture are interesting, and deserve a little study.

Starch is a peculiar component part of vegetable substances, bearing a curious relation to sugar and to alcohol. Starch, sugar, alcohol or spirit, and vinegar, are all composed pretty much of the same ingredients; and by the processes of malting, mashing, distillation, and acetification, the same grain of corn may be made to yield any one of these very different products. We here speak of starch from grain, but it exists in many different kinds of vegetables. For instance, it exists in the seeds of nearly all kinds of corn; in tap-roots; in potatoes and other tuberose roots; in the stems of palm-trees, and many other kinds of plants; and in many species of lichen. The nature of the starch itself is not less remarkable than the diversity of the sources whence it may be obtained; it is always mixed with other chemical principles, from which it is separated when required to be used simply as starch. It consists of very small roundish white granules, which are generally lodged in the cells of the cellular tissue. These granules differ in size often in the same seed or plant, being smallest near the circumference of the containing plant. Each granule consists of a membrane, often beautifully marked, and containing a transparent colourless material resembling gum. The membrane is insoluble in cold water, but is soluble at a temperature of about 160° Fahr.

Starch and gluten form the two main ingredients in the flour or meal of which bread and pastry are made; and it happens fittingly that the kind which is best suited for making bread is not that which is most appropriate for starch. Pure starch, though a jelly-like substance when mixed with water, is rather indigestible; and flour which contains a large proportion of starch in relation to the gluten is not well fitted for making bread. The best bread is made of flour which contains the greatest proportion of gluten; and the

quality of bread is apt to be varying from the circumstance that the relative proportions of starch and gluten differ not only in the different kinds of corn, but in the same species or variety, according to the season when they are sown, or the manure which has been applied to the land. Sir Humphry Davy found that in spring-grown wheat, one hundred parts yielded seventy of starch to twenty-four of gluten; while autumn-grown wheat yielded seventy-seven of starch to nineteen of gluten. It has been observed by a practical agriculturist, that "were a scientific system of agriculture to prevail in this country, one kind of wheat, treated with proper manure, would be raised and sold exclusively to the starch-manufacturer; while another kind, treated with its proper manures, would be raised for and sold only to the baker.

Rice is very rich in starch, in comparison with the gluten which it contains. It is said that Carolina rice is more abundantly supplied with it than any other grain, insomuch that there is not more than three or four per cent. of gluten with it. That potatoes contain starch may be made readily visible by the following simple process:—Rasp or grate a potato to fragments over a sieve; pass a current of water over the raspings, and this water will pass through the meshes of the sieve in a milky state; let the water remain stationary some time, and a starchy deposit (more or less mixed with other bodies) will appear at the bottom of the vessel. The combination of gluten with the starch in flour is not recognisable by the eye, but the separating of the two may be very readily effected by the following method:—Make up a stiffish paste of flour and water; leave it at rest for a time; and then carefully and gently knead it between the fingers, while a current of water is flowing on it; the water will wash away the starchy particles, leaving behind a tenacious elastic substance which constitutes gluten.

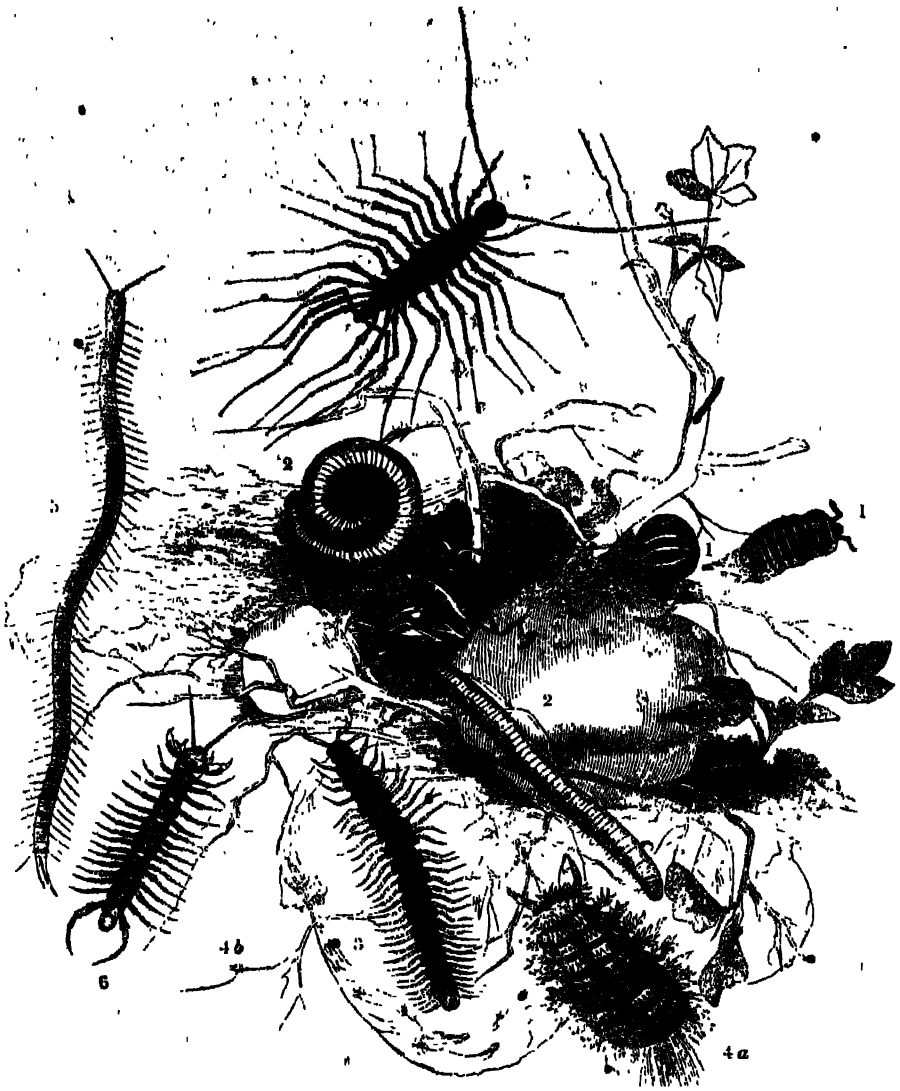
For the practical purposes of commerce, starch is generally prepared from wheat, and there are different modes of proceeding, one of which is as follows:—The grain, sifted clean, is steeped in water until it becomes swollen and soft; after removal from this water, it is immersed in clear warmish water, and then put into bags, which bags are exposed to strong pressure. This pressure forces out the starchy particles into water; and the water being removed and replaced by clean, still more of the milky liquid is prepared, and the moistened grain loses pretty nearly all its starch. Instead of the pressure, the grain is sometimes crushed under vertical grindstones, or between rollers, and the starch washed out from the fragments. The milky liquor, by whichever method obtained, is poured into large cisterns, where it is allowed to settle and deposit its starch. The surface-liquor is poured off, new water added and stirred up with the starch, a second settlement allowed, a second removal of the surface-liquor, and so on several times, until nearly all the foreign ingredients, such as gluten, sugar, gum, and albumen, are washed out and separated from the starch. After the final deposition of sediment, there appears on the surface a thin layer of gluten and albumen, called 'slimes,' which is removed, and used for feeding pigs or oxen. The starch beneath is in layers or strata of different quality, the particles first deposited being purer than those at the surface; and by a dextrous contrivance these different qualities are removed one by one, and permanently separated. After being again mixed with water and passed through a fine sieve, the starch is laid on linen cloths in wicker baskets, where it is allowed to dry gradually. The solid starch is then cut into pieces, and placed in a warm room or stove to dry.

Another mode of conducting the manufacture exhibits many points of difference from the above. The wheat is first crushed between iron rollers, and steeped in as much water as will cover it. Being thus allowed to remain several days, the mixture ferments, and the starchy particles by degrees fall to the bottom. After a subsequent fermentation in another vessel, the starch is separated by a sieve from the bran with which it had become mixed, and is afterwards allowed to settle for several hours in square frames or cisterns. The surface water is let off through taps or cocks in the side of the vessel; the 'slimes,' or thin mixture of gluten and albumen, is removed; the washing with water and the deposition of sediment are again repeated, and the same series goes over two or three times. After this the starch receives the blue colour which most kinds present, by having a small quantity of smalt mixed up with it. The starch is then transferred to oblong wooden boxes or trays, which are pierced with holes and lined with thin canvas. In these boxes it remains to drain and solidify, and is afterwards turned out in a solid compact form. The mass of starch is broken or cut up into pieces four or five inches square, and the pieces are placed upon a flooring of very absorbent bricks, where they very soon dry. The drying in a stove, the scraping of the pieces with a knife, the packing in paper, and the final drying of these packages, complete the series of operations.

There are many modifications of the processes, followed by different persons and in different places; but in all of them the separation of the starch from the other component parts of the grain is brought about by pressure, bruising, or rubbing, aided subsequently by fermentation, washing, straining, and drying. There is a "patent starch" made of Indian corn, and many other varieties of starch, for which the credit of more or less excellence is obtained; sometimes it is a new kind of seed or root which is brought into use for this purpose; sometimes a new modification of the process of manufacture; at other times a new arrangement of apparatus; but the broad principles are pretty much alike in all. As a further example, we may notice the mode of making potato-starch for sale. The potatoes, after being well washed in a cylindrical cage, are brought to the state of a pulp by means of a rasping-machine, consisting of a roughened hoop or cylinder so placed as to grind the potatoes to fragments while it is revolving. The pulp (which is wetted while being rasped) falls into a vessel beneath; and with a machine worked by two men, two or three tons of potatoes may be reduced to pulp in a day. This pulp, by washing, stirring, settling, drying, &c., is made to yield its starch, which, by a well-managed process, amounts in quantity to from fifteen to twenty per cent. of the weight of the potatoes used.

Some of the calico-printers use a kind of stiffening material or starch, which they call British gum, and which was brought into use on account of the high price of gum-Senegal. This British gum is prepared from wheat-flour, and is a kind of medium between common starch and common flour-paste.

A starch-factory is one of the least inviting to a mere visitor; for almost the only processes to be seen are conducted in buildings full of vessels containing the 'sours,' or fermenting mixtures of starch and water, in various stages of progress. The odour is anything but agreeable; and unless the looker-on can find something to interest him in contemplating the chemical changes involved in the process, his stay would probably not be a long one. Starch, however, is a material rather extensively used in the arts, besides the well-known domestic purpose to which it is applied; and its production is certainly worth a passing thought.



[1. Glomeris marginata, rolled up and extended; 2. Julus terrestris, rolled up and extended; 3. Polydesmus complanatus; 4. Pollyxenus. *a*, magnified; *b*, natural size; 5. Geophilus longicornis; 6. Lithobius forficatus; 7. Scutigera coleoptrata.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

CENTIPEDES AND MILLEPEDES.

The group at the head of the present article presents us with an association of creeping things, from which many turn with indifference, if not disgust, but which are nevertheless far from being destitute of interest. It must be confessed indeed that they are neither striking in their appearance nor obtrusive in their habits; they are creatures of darkness, and conceal themselves from observation. It is during the gloom and silence of night—

> "When the dew is on the grass,
> And the wisp on the morass,"

that they come forth from their lurking-places, and wander abroad in search of food; but with the dawn of day they seek the obscurity of their retreats. These creatures constitute a group termed by naturalists Myriapoda, the first order of insects according to M. Latreille, but really forming a distinct section or class, of the subkingdom articulata, and displaying affinities to the crustacea, scorpions, and insects, yet distinguished by characters of their own. They are composed of a series of distinct segments, and to every segment is appropriated one pair of limbs; sometimes indeed two pairs.

The head is furnished with jaws, antennæ, which are regarded as feelers, and eyes either simple or compound. Respiration is effected through spiracles, as in insects, whence air-tubes ramify over the internal viscera. Like insects, they undergo a metamorphosis, or rather several changes before acquiring their perfect form; and the sexes are distinct.

Their movements are winding and serpentine; some are slow, gliding gently along; others, on the contrary, are active and rapid in the extreme. They feed on

decayed vegetable and animal substances, on fruits, roots, &c., and many on living prey.

The Myriapoda resolve themselves into two distinct tribes, one represented by the Millepede, the other by the Centipede. The first, Chilognatha, Latreille, the genus Julus of Linnæus, comprising the Millepedes, is characterized by the cylindrical form of the whole body; the antennæ are composed of seven joints; the first segment of the body, sometimes the second, is the largest, and presents the appearance of a corslet or little buckler. It is not until the fourth year in some, the fifth or sixth in others, that the pair of limbs on the several segments become doubled, and that maturity is attained. They live upon decayed animal and vegetable substances, and are found under stones, in the ground, at the foot of old walls, in the fissures and under the bark of time-worn trees. If we take the Millepede as an example of this tribe, we observe it to be elongated and cylindrical in form, divided into rings or segments, and capable of rolling itself up spirally into a ball. The segments are from forty to fifty in number, smooth, horny, and convex above. Each segment in the perfect animal is furnished with two pairs of short legs (certain segments excepted), by means of which the animal appears to glide along, without any effort, the legs being almost invisible as we look down upon the moving creature. The respiratory orifices or stigmata are placed on the sternal (or lower) aspect of each segment, and lead to a double series of aerating sacculi, whence tubes emerge, to be distributed on the internal organs. In addition to these breathing orifices a series of pores runs down each side of the body, exuding an acid secretion of unpleasant odour.

The mouth is furnished with two stout horny jaws, one on each side, as we see in caterpillars, acting against each other; their cutting edges are serrated, in order that they may be rendered effective in dividing the fibres of decayed wood, or the dead roots of plants.

The female millepede deposits her eggs, which are very minute, in the earth or in the earthy powder of decayed wood, which is in fact a rich vegetable mould. We have said that the young undergo a series of transmutations before arriving at their perfect development. The progress of these changes has been watched by De Geer, Savi, and other zoologists, and are too remarkable to be passed by unnoticed. The young when first hatched are very minute, utterly destitute of limbs, quite smooth, and of a kidney shape, but of course so minute as to require a lens for examination. In the course of a few days afterwards they undergo a sort of moult, changing the skin, and then appear divided into about eight segments; a pair of simple eyes appears on the head, which is furnished also with two antennæ; the three segments following the head have each a pair of limbs. In a few days a second moult takes place, the body is enlarged, the number of segments increased, and the number of limbs augmented to seven pairs, one pair on each segment succeeding the head. At the age of a month, or thereabouts, a third change takes place, and the millepede appears with twenty-two segments and twenty-six pairs of feet, but of these the anterior eighteen pairs only are used in progression. The general form and aspect now approximates to that of the adult. Some time now elapses before the fourth moult, which gives thirty-six pairs of legs. Subsequently the male acquires thirty-nine rings, and the female sixty-four, with two pairs of limbs to every segment. But after this, two years elapse before the perfect development and maturity of the animal is completed.

Such is a summary of the observations recorded, to which it may be added, that the changes from the first to the fifth take place from the month of March, the time when the eggs are hatched, to the end of July or beginning of August.

Whether these changes are as precise as stated, we think a matter of doubt. At all events we have recently examined and sketched a female Julus of considerable size, with forty-six rings, and eighty-two legs on each side. The first segment after the head had a pair of limbs on each side, that is a double pair altogether; between the first and second segment appeared a distinct orifice; and then appeared only one limb on each side; to this succeeded two limbs on each side for every segment, excepting the three caudal segments, which were destitute of limbs.

The common Millepede (Julus terrestris) is too well known to need description; it lives in light vegetable mould in gardens or plantations, under old walls, stones, logs of wood, and the like: it feeds on vegetable matters. Our European Millepedes are all of small size; there is, however, a species found in Brazil, the Julus maximus, Linn., of the length of seven inches.

Certain millepedes are separated from the genus Julus, in consequence of the form of the segments, which are not only less convex, but their outer margin is reflected up, and forms a projection with a point at its posterior angle. They are of small size, and found in damp places in the earth: they form the genus Polydesmus of Latreille. To those in which the eyes are apparent, Dr. Leach gave the name of Craspedosoma. The Polydesmus complanatus (Julus complanatus, Linn.) is by no means uncommon in gardens. It is more active in its movements than the common millepede, and is capable of rolling itself up.

Another genus is termed Glomeris by Latreille. The species have much resemblance to the woodlouse (oniscus), or rather the Armadillo Woodlouse (Armadillo, Latr.); they are oval in figure, and have the power of rolling themselves up into a ball, like the Armadillo, with which indeed they are often confounded by superficial observers; insomuch that from the comparison of actual specimens, we have drawn out the most palpable differences, to serve as a guide to young inquirers. In Glomeris, taking the Pill Millepede as our example, the limbs are small, and arise from a median abdominal line; they are short and numerous, and do not appear laterally beyond the jointed carapace or backplate.

In Armadillo (an Isopodous Crustacean, as is also the common Woodlouse) the limbs are large, proceed from the sides of the abdomen, and extend beyond the back plate, excepting the hind pair. In the Pill Millepede (Glomeris) the head is larger and more concealed, the antennæ are short and end club-shaped.

In the Armadillo Woodlouse the antennæ are longer and filiform or pointed.

In the Pill Millepede the shelly covering is firm; in the Armadillo much softer, as in Oniscus. The terminal segment of Glomeris is large, of Armadillo small and triangular. In the latter the lateral edge of the dorsal armour along each side is serrated, in the former continuous.

The Glomeris, or Pill Millepede, is black, with yellow margins to the rings or segments. Armadillo is yellowish-grey clouded with brown, or brown with yellow blotches; it exceeds the Pill Millepede in size. Both are common, and roll themselves up in the form of balls, and were formerly used in medicine. A species of Armadillo from Italy (A. officinalis) was employed on the Continent. The Pill Millepede, Glomeris marginata, Leach (Julus ovalis, Linnæus), is found under stones and amongst moss, and in the same situations as the common Millepede. Both the Pill Millepede and the Armadillo Woodlouse are abundant

in the writer's garden; they feed on decomposed vegetable matters.

There is a singular little creature, the Jule à queue en pinceau, found in hothouses, under frames, under the bark of aged trees, and in the fissures of walls, which was placed by Linnæus in the genus Scolopendra; it belongs, however, to the present section, and constitutes the genus Pollyxenus of Latreille. At first sight it appears very like the larva of that beetle well known from its destructive habits in museums, viz. the Anthrenus Musæorum: it is oblong in form, with tufts of little scales along the sides, and a pencil of hairs at the tail. There are twelve pairs of limbs. It is the only known species, and was termed Scolopendra lagura by the older writers. It varies in size from a line to two lines and a quarter in length; the body is brown; the head black; the caudal pencil of hairs white. Like the Juli, in general it feeds on decomposed vegetable substances. In one important point, however, it differs from the true Millepedes: the body is not invested with firm shelly plates, but is soft, and covered by a membranous investment. Like the Woodlouse, it is gregarious, numbers collecting together in the same hiding-place. We may here observe that the common Millepede and Pill Millepede are gregarious; but, as far as our own observations go, not the Polydesmus complanatus or flat-backed Millepede, which, in some respects, approaches in its manners as it does in its appearance to the predatory Centipedes, which are solitary, like carnivorous beings in general.

The second family of Myriapods (Chilopoda, Latreille) comprehends the Centipedes, &c.

Of these voracious creatures several species are well known in our island, but it is in the hotter regions of the earth that they are the most numerous and attain to the largest dimensions.

In the Centipedes or Scolopendræ the body is long and flattened, and covered above by a series of dorsal plates, and below by a separate series, the sides being simply membranous. This provision admits of snake-like flexibility and of that rapidity of motion for which these Centipedes are so notorious. They are in fact daring and active carnivorous animals, preying upon insects and worms. Night is their season of activity; during the day they lie concealed under stones, beams of timber, in holes amidst brick-work, or even in the ground. Fitted for a life of rapine, they are very formidably armed: our British species indeed, though not very pleasing in appearance, are at all events not to be dreaded; but when we go into warmer climates, we find these creatures terrific from the wounds they inflict. If we examine them, we see that the mouth is not only provided with horny jaws as in insects, but with two terrible fangs jointed in the middle, sharp at the points, and perforated near the tip by a minute orifice through which a poisonous fluid is instilled into the wound, and which, in some species of large size tenanting India, South America, &c., often produces the most severe consequences, if not death. We have measured a specimen twelve inches in length and one inch and a quarter across the largest back plates; but if Ulloa be not indulging in extravagance, it was a pigmy to those of which he talks, and which he says measured a yard in length and five inches in breadth, inflicting a mortal wound. Let not our reader suppose that we give full credence to this statement: but be this as it may, the annoyance which these creatures cause to Europeans visiting intertropical climates is of no trifling account. They creep into houses, lurk under articles of furniture and behind wainscots, hide themselves in drawers and similar places, and sometimes in beds, to the disgust and apprehension of all not familiarized with their presence. In the south of France, Spain, and Italy, a large species (Scolopendra cingulata, Latr.) is very common. In our country, among the species of small size which are indigenous, the most common is the forked Centipede, Lithobius forficatus (Scolopendra forficata, Linn.); it is found in the earth under stones, and is quick and active in its movements. The limbs are fifteen on each side. The general colour is tawny red. Length about an inch and a quarter, sometimes more.

A group of Centipedes, distinguished by the generic title of Geophilus, presents us with several species remarkable for their great length and slenderness and the number of their limbs, which exceed forty-two on each side. They are tortuous in their movements, and by no means so rapid as the ordinary Centipedes; they live in the earth, and make their way through the minutest fissures or apertures with the utmost facility. Of the slender animals of this genus most, if not all, are phosphorescent, and gleam in the dark, though not so intensely as the Glow-worm. The Geophilus electricus may be often seen at night during the summer months on the grass of lawns or on garden walks, palely glistening like a luminous thread as it winds its tortuous way. The long-horned Geophilus (G. longicornis) is another species by no means uncommon; it is larger than the G. electricus, and broader in proportion. Under the genus Scutigera are placed certain strange-looking Centipedes, found in the south of France, in southern Europe, Madeira, &c., remarkable for the length of their limbs. None have yet been found on our island. The back is plated with eight scales, thickened behind and notched; the body beneath is divided into fifteen semirings, each carrying a pair of legs, with long and slender terminal joints; the eyes are large and compound; the antennæ long. The European species, Scutigera coleoptrata, is very active, running with great quickness; it conceals itself behind the beams and wood-work of houses, emerging at night, and traversing the floors in quest of food. India and America have their respective species, and they are among those unwelcome intruders which annoy the European, who is not easily reconciled to the presence of centipedes, scorpions, and scutigeræ in his apartments.

The subjects represented in the engraving are—1, the Pill Millepede (Glomeris marginata); 2, the common Millepede (Julus terrestris); 3, the flat Millepede (Polydesmus complanatus); 4, the Pollyxenus, or brush-tailed Millepede—*a*, magnified; *b*, the natural size; 5, the long-horned Centipede (Geophilus longicornis); 6, the common Centipede (Lithobius forficatus); 7, the Scutigera coleoptrata.

Mogadore.—Mogadore, or Suera, as the Moghrebins call it, the port of the town of Morocco, lies on the seashore between Cape Cantin and Cape Ghir. It was founded in 1760. Mogadore is built on a low shore, consisting of moving sand, which extends from five to fifteen miles inland, where a fertile country begins. It is regularly built, the streets being straight, but somewhat narrow. The Europeans settled here have erected several large buildings in the African style. The town is divided into two parts, one of which is called the Fortress, and contains the custom-house, the palace of the Pasha, the other public buildings, and the houses of Europeans; the other part is only inhabited by Jews. The harbour is formed by a small island, lying south-west of the town, and about two miles in circumference. At low tides there are only ten or twelve feet water in the harbour, and large vessels are obliged to anchor without, at a distance of two miles. The commerce of this place with London, Amsterdam, Cadiz, Leghorn, Genoa, the Canary Islands, Hamburg, and the United States of America, is considerable. The population is ten thousand, according to Jackson; or seventeen thousand, according to Graberg.—*Penny Cyclopædia.*



[Andrea del Sarto, and Group from the Madonna del Sacco.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXXI.

ANDREA DEL SARTO.

ANDREA Vannucchi was the son of a tailor (in Italian *Sarto*), hence the appellation by which he was early known, and has since become celebrated: he was born in 1478, and, like many others, began life as a goldsmith and chaser in metal, but soon turning his attention to painting, and studying indefatigably, he attained so much excellence that he was called in his own time "Andrea senza errori," that is, Andrea *the Faultless*. He is certainly one of the most fascinating of painters, but in all his pictures, even the finest, while we are struck by the elegance of the heads and the majesty of the figures, we feel the want of any real elevation of sentiment and expression. It would be difficult to point out any picture of Andrea del Sarto which has either simplicity or devotional feeling.

A man possessed of genius and industry, loving his art, and crowned with early fame and success, ought to have been through life a prosperous and a happy man. Andrea was neither:—he was miserable, unfortunate, and contemned through his own fault or folly. He loved a beautiful woman of infamous character, who was the wife of a hatter; and on the death of her husband, in spite of her bad reputation and the warnings of his best friends, he married her: from that hour he never had a quiet heart, or home, or conscience. He had hitherto supported his old father and mother: she prevailed on him to forsake them. His friends stood aloof, pitying and despising his degradation. His scholars (and formerly the most promising of the young artists of that time had been emulous for the honour of his instructions) now fell off, unable to bear the detestable temper of the woman who governed his house. Tired of this existence, he accepted readily an invitation from Francis I., who, on his arrival at Paris, loaded him with favour and distinction; but after a time, his wife, finding she had no longer the same command over his purse or his proceedings, summoned him to return. He had entered into such engage-

ments with Francis I. that this was not easy; but as he pleaded his domestic position, and promised, and even took an oath on the Gospel, that he would return in a few months, bringing with him his wife, the king gave him licence to depart, and even intrusted him with a large sum of money to be expended in certain specified objects.

Andrea hastened to Florence, and there, under the influence of his infamous wife, he embezzled the money, which was wasted in his own and his wife's extravagance. He never returned to France to keep his oath and engagements. But though he had been weak and wicked enough to commit this crime, he had sufficient sensibility to feel acutely the disgrace which was the consequence; it preyed on his mind and embittered the rest of his life. The avarice and infidelity of his wife added to his sufferings. He continued to paint, however, and improved to the last in correctness of style and beauty of colour.

In the year 1530 he was attacked by a contagious disorder; abandoned on his death-bed by the woman to whom he had sacrificed virtue, fame, and friends, he died miserably, and was buried hastily, and almost without the usual ceremonies of the church, in the same convent of the Nunziata which he had adorned with his works.

Andrea del Sarto can only be estimated as a painter by those who have visited Florence. Fine as are his oil-pictures, his paintings in fresco are still finer. One of these, a Repose of the Holy Family, has been celebrated for the last two centuries, under the title of the *Madonna del Sacco*, because Joseph is represented leaning on a sack. There are engravings of it in the British Museum.



[St. Joachim.]

The cloisters of the convent of the Nunziata, and a building called the Scalzo, at Florence, contain his most admired works. His finest picture in oil is in the Florence Gallery, in the cabinet called the Tribune, where it hangs behind the Venus de' Medici. It represents the Virgin seated on a throne, with St. John the Baptist standing on one side and St. Francis on the other; a picture of wonderful majesty and beauty. In general his Madonnas are not pleasing; they have, with great beauty, a certain vulgarity of expression, and in his groups he almost always places the Virgin on the ground either kneeling or sitting. His only model for all his females was his wife; and even when he did not paint from her, she so possessed his thoughts that unconsciously he repeated the same features in every face he drew, whether Virgin, or saint, or goddess. Pictures by Andrea del Sarto are to be found in almost all galleries, but *very* fine examples of his art are rare out of Florence. The picture in our National Gallery, attributed to him, is very unworthy of his reputation. Those at Hampton Court are not better. There is a fine portrait at Windsor. In the Louvre is the picture of Charity, No. 85, painted for Francis I. when Andrea was at Fontainebleau in 1518, and three others. Lord Westminster, Lord Lansdowne, Mr. Munroe of Park Street, and Lord Cowper in his collection at Panshanger, possess the finest examples of Andrea del Sarto which are in England. At Panshanger there is a very fine portrait of Andrea del Sarto by himself: he is represented as standing by a table at which he has been writing, and looking up from the letter which lies before him. The figure is half-length, and the countenance noble, but profoundly melancholy. One might fancy that he had been writing to his wife.

THE ENGLISH AND IRISH ORDNANCE SURVEYS.

There are occasionally notices in parliament, either in the form of "estimates" or of answers to questions, of the *Ordnance Survey*. What this survey may mean, and how parliament comes to be connected with it, are matters not by any means generally known. A few explanatory details, sufficient to give a general understanding of the object in view, may not be misplaced.

An ordnance survey, or a trigonometrical survey (for the two names signify the same thing), is a minute examination of the surface of a country for the purpose of laying down an exact delineation of its geographical features; the positions of its mountains, valleys, lakes, rivers, forests, marshes, &c.; the heights of its mountains; the contour of its coasts; the artificial boundaries of the country into counties, hundreds, baronies, &c.:—this is the grand object of such a survey. It is an *Ordnance* survey, because in this country it is superintended and carried on by officers of the Board of Ordnance; it is a *Trigonometrical* survey, because it is effected chiefly by the measurement of triangles, according to the rules of trigonometry. For no other purpose whatever is a country so thoroughly examined as for this survey. Not only is every plain, every mountain, every valley visited, but every field and hedge is brought under the immediate cognizance of the surveyors. The result may either be the determination of a number of distinct positions, which admit of being described in a book, or the marking of all the boundaries and other features in such a manner as to facilitate the construction of a map; both objects may be combined, but generally speaking it is understood that the main object of such a survey is the preparation of maps of such undoubted accuracy as to serve as standards in all investigations which concern the geographical and territorial divisions of a country.

It must not be imagined that such a survey is the work of a year or two merely, or of a dozen years. Nothing but a surveying force amounting almost to an army would be adequate to the trigonometrical survey of a country in a few years. Half a century

has been already expended in the survey of Great Britain, and it is yet far from completion; and, so great is the importance of this survey deemed, and so much greater would that importance be if the *scale* of the survey were of greater magnitude, that the maps in future are to be published on a scale of six inches to a mile, and of those already done the country will probably be re-surveyed and completed on the same scale.

The Ordnance Survey of Ireland is the most minute and complete that has ever been effected, or carried on nearly to completion: but before we can understand its general character, we must notice the survey of England, which preceded it, and apprenticed the officers to the necessary arrangements for its practical conduct.

About a century ago, when the English government had to watch narrowly the proceedings of the Young Pretender and his friends in Scotland, it was deemed important to establish military posts, and to open roads of communication through the remotest parts of Scotland; and a body of infantry having been encamped with a view to facilitate this object, Lieutenant-General Watson, who was then officially employed as deputy quartermaster-general, conceived the idea of making a map of the Highlands. This was the first germ of the trigonometrical survey of later times. The Duke of Cumberland, who commanded the troops in Scotland, approved of the idea, and employed General Roy to carry it out. The survey was commenced; and as its promised utility was seen to be great, it was extended beyond the limits at first intended, and by degrees included the whole of Scotland. The breaking out of the Seven Years' War, however, by distracting the attention of the government from home improvements, put a stop to the survey, and the map resulting from the labours already bestowed was never published. The survey answered the purpose for which it was immediately intended, in assisting the works of the government engineers, but it was not minute or complete enough for other purposes.

When the Seven Years' War was concluded, the project was started of making a general survey of the whole island on an improved scale and with more perfect instruments. Nothing was, however, done in the matter for some years; but it was afterwards revived by indirect means. It is a point of importance to astronomers that the exact positions of their observatories, with reference both to one another and to their respective latitudes and longitudes, should be laid down with rigorous accuracy; and General Roy undertook a series of surveys and measurements with a view to attain this accurate determination of the relative positions of Greenwich Observatory and other observatories near London. Cassini, an eminent astronomer on the Continent, about the same time proposed to the English government a survey for the purpose of determining the relative positions of the Paris and Greenwich observatories; and as the Royal Society warmly supported this proposal, the government undertook to defray the necessary expense, and intrusted General Roy with the management of the enterprise. This was the commencement of the real trigonometrical survey, for it matters not whether two points selected be observatories, churches, or the summits of mountains; if it be wished to determine their exact distance and relative positions, the mode of obtaining the requisite measurements will be the same.

It will perhaps seem strange to those unaccustomed to the subject, that the accurate measurement of *one* line should form the groundwork for the whole of the measurements throughout a country—yet so it is. If a church, a hill, and an obelisk are visible from each other, and if the distance from one to a second (say from the church to the hill) can be accurately measured, then the distances from the church to the obelisk and from the hill to the obelisk can be determined *without measurement*. There are instruments, such as the theodolite, which will measure all the angles of the triangle formed by the three objects; these angles, together with the known length of one side of the triangle, when brought to bear in certain trigonometrical calculations, will give the exact lengths of each of the other two lines. Each of these sides may then be made the *known* side of a new triangle, by bringing in some new conspicuous object, such as a second obelisk or a second church; and thus the triangulation, or formation of new triangles, goes on, until the whole country is covered with a network of lines, the length of every one of which is known with the most rigorous accuracy, although none of them may have been accurately measured except the first one. It requires an extension beyond our every-day ideas to conceive a line whose length is accurately known without being actually measured; but this is the very gist of the subject.

As everything depends on the original or *base* line, the slightest error in the length of this line will affect every single calculation afterwards; and the more so, the farther it is removed from the beginning, since the error will multiply itself in every successive triangle. Hence the determination of this line is the primary and the most important part of the surveying operations. In the common measurements by a rule or a string or a chain, for manufacturing or commercial purposes, a sufficient approach to correctness is obtained; but in a base-line for a survey, where an error of one inch in a mile would be serious, the difficulties of ensuring accuracy are almost inconceivable. Every substance employed as a measure will expand and contract by variations of heat; every rod which seems straight to the eye has some flexure or other; and every observer has peculiarities of eye or of discrimination which may lead him to results not quite accordant with those of other observers.

We shall thus be prepared to believe that the accurate measurement of a base-line was the object of General Roy's first attention. He selected Hounslow Heath as the spot where this line should be made. His measuring instrument consisted of three deal rods, on which lengths of twenty feet were laid off by Ramsden, and a standard rod, with which the former were from time to time compared. These rods were so strengthened as to be rendered as inflexible as possible. The weather, however, proved very wet and unfavourable; and the deal rods were subject to so much expansion and contraction, that their length on one day was no criterion as to their length on another. Whereupon General Roy resolved to employ glass rods as being less subject to expansion. Three hollow glass tubes, perfectly straight, were accordingly prepared; they were twenty feet long by an inch in diameter. They were graduated by Ramsden, and were inclosed in cases so as to prevent them from bending, but not from expanding or contracting. In the month of August, 1784, the measurement was effected with these glass rods. The distance measured, or the length of the base-line, was about twenty-seven thousand feet (rather over five miles); and the length as measured by the glass rods differed by about twenty inches from that given by the deal rods—a trifling quantity, as it may appear to most persons, but of importance in reference to the object in view. Many minute corrections were made, and the final result stated to so minute a quantity as the ten-thousandth part of a foot.

A base-line being thus formed, the triangulation commenced. The summits of lofty hills, obelisks, and

church steeples, lighthouses, and artificial beacons, were selected as points for triangles, and the various angles and lines were determined one by one. The French astronomers made observations across the Channel to the English coast; the English observers did the same in respect to France; and thus the two countries were included in the same triangulation. The immediate object was answered, by determining, within a near approach to accuracy, the relative positions of the observatories at Paris and Greenwich.

General Roy died in 1790; and soon afterwards a regular survey of England was commenced under the orders of the Ordnance Office. The first thing was, to remeasure the base-line on Hounslow Heath. This was effected by means of two steel chains of exquisite construction, graduated to a certain length. The length was found slightly different from that determined by General Roy, and the new length was thenceforward adopted. Then commenced the triangulation. Elevated spots, such as Beachy Head, Dunnose, Hanger Hill, &c., were chosen as stations, and the distances of these, one from another, were determined by observation and calculation. Year after year something was added to the results obtained: at one time a new base was measured, to verify the old one; at another time arcs of the meridian were determined, and new districts of the island were gradually brought within the scope of survey. Colonel Colby was placed at the head of the survey in 1809, a position which he has occupied ever since, working out this great object as rapidly as the funds placed at his disposal would admit.

When the country was parcelled out into certain great triangles, these were subdivided into smaller ones, and these into smaller again, so that at length every minute spot was laid down and calculated to its true position. It was an astronomical operation to determine the latitude and longtitude of particular spots, and all the resources of mathematical and geodesical science were requisite in determining the great triangles accurately; but when these were once determined, the smaller triangulation approached nearer to the character of land-surveying, and required skill of a less exalted kind, such as is noticed in some of our former Numbers.

It was part of the plan of the Ordnance Survey to have correctly engraved maps of the whole of the kingdom. This plan has been gradually carried out during the time that Colonel Colby has been at the head of the survey. There is a regular establishment of draughtsmen and engravers in the pay of government, who have been for many years engaged in preparing for publication the maps resulting from the survey. All the maps are in uniform style. They contain every road, pathway, stream, hill, &c. in the kingdom, and are beautiful specimens of close engraving. The scale is uniformly that of one inch to a mile; and it is printed in sheets in such a manner that these might be placed edge to edge, without any repetitions; so that the whole of England and Wales would form a splendid map thirty feet high by twenty-four or five in width. All the southern part of the kingdom has been published for many years; but much yet remains to be done in the north, near Scotland; while Scotland itself is yet wholly unpublished.

These maps are each somewhere about thirty inches long by twenty-four in width; and the government has established an office where they are sold at about seven or eight shillings each. Some of them are divided into quarters, which sell at about two shillings each; and purchasers have thus sometimes the opportunity of procuring a portion of the map, relating to a particular spot, at a very cheap rate. Thus, one of these quarter-sections, measuring about fourteen inches by twelve, contains the whole of the Pottery district in Staffordshire, produced in a style of unparalleled minuteness and accuracy, and purchasable for less than two shillings.

In 1840 there were eighty of these large plates completed and published, and several more in hand; since which time a further advance has been made. Circumstances led to the withdrawal of the surveying staff from Scotland to Ireland some years ago, and the operations in the former country were for a time suspended. They were renewed however in 1838; and will be followed at some future time by the publication of engraved maps of Scotland. It has been proposed to effect this on the magnificent scale of six inches to the mile, for reasons which will be better understood when we have spoken of the Irish Ordnance Survey. Meanwhile we may state that down to the year 1841, about 340,000*l.* had been spent on the survey in England, Scotland, and Ireland. The sale of the maps is solely as a national benefit; it is not intended to pay the expenses of the survey. Great indeed would be the selling price, to effect this.

[To be continued.]

THE HAREEM OF IBRAHIM PASHA.

[From 'The Englishwoman in Egypt,' by Mrs. Poole.]

The chief residence of his ladies is the Kasr el-Dubárah, a fine house situated on the west of Cairo, on the eastern bank of the Nile, and justly their favourite retreat. After riding through the plantations of Ibraheem Pasha, which almost surround the palace, we arrived at the great gates of the Kasr, through which we entered a long road within the high walls covered with trellis closely interwoven with vines. At the end of this we dismounted, and walked on a beautiful pavement of marble through several paths, until we arrived at the curtain of the hareem. This being raised, we were immediately received by a young wife of Mohammad 'Alee, who addressed my friend Mrs. Sieder in the most affectionate terms, and gave us both a most cordial welcome. In a moment a crowd of ladies assembled round us, vying with each other in paying us polite attention; and having disrobed me, they followed us (the wife of the viceroy with us leading the way) to the grand saloon.

This is a very splendid room, paved with marble, as indeed are all the passages, and, I imagine, all the apartments on the ground-floor: but as several are entirely covered with matting, I cannot assert this to be the case. The pavement in the saloon is simply white marble, the purest and best laid I have seen in the East. The ceiling (which is divided into four distinct oblong compartments) is painted admirably in stripes of dark and light blue, radiating from gilded centres, from each of which hang splendid chandeliers containing innumerable wax-lights. The corners and cornices are richly decorated. The pavement under the two centre compartments is not matted, but the two ends, to the right and left on entering, are covered with fine matting, and fitted with crimson divans.

The windows are furnished with white muslin curtains edged with coloured fringe, some pink and some blue. All the looking-glasses (of which there are perhaps six in the saloon) are furnished with festoons and curtains of pink and blue gauze. There is one table with a cover of pink crape embroidered in stripes of gold, and having upon it a large glass case of stuffed birds. On either side of the door are fanciful stands for large square glass lanterns, composed of pillars, round which are twined artificial flowers. The windows are European in form, and the hareem blinds are, composed of tasteful iron-work; I can scarcely say filigree, the pattern is too bold. The entire interior

decorations are in light and summer taste, and the saloon charmingly cool.

We crossed to an apartment on the opposite side, where the same lady placed us on the divan and seated herself by our side. The room is entirely covered with matting, and furnished with most luxurious divans, extending round three sides, not raised (as is usual) on a frame about a foot or more in height, but entirely of cotton, forming mattresses two feet in thickness, placed on the ground. These are covered with very gay chintz, as are also the cushions which incline against the walls; and at the right and left upper corners are distinct square cushions, covered with white muslin embroidered with black braid, and each having black cushions to correspond. Above all these there is a row of small cushions, covered with white muslin and embroidered with black, corresponding in pattern with the corner seats. The curtains resemble those in the saloon.

Here we received coffee, which was handed to us by the chief lady of the household, the treasurer, a particularly lady-like person, to whom it was handed by a lady who bore it on a silver salver, attended by several others; one carrying the little coffee-pot in a silver vessel, suspended by chains, and also used as a censer, containing burning charcoal. The whole group was most picturesque, and many of the ladies were fair, young, and beautiful.



[Coffee Service.]

A lady of the household returning to the saloon, that she might conduct us to the widow of Toosoon Páshá, and to the daughter of Mohammad 'Alee Páshá, who were sitting at the upper corner. I found the former lady seated on a cushion on the ground, next to the right-hand corner, and the daughter of the Viceroy took the seat of honour, which was also a cushion placed on the ground. Numerous ladies and slaves were in attendance: all standing in a line before the edge of the mat.

We were soon joined by another wife of the Páshá, the mother of Mohammad 'Alee Bey (a boy about nine years of age); her designation is "The lady, the mother of Mohammad 'Alee Bey."

Soon after noon, dinner was announced; and the widow of Toosoon Páshá led the way to a room adjoining the saloon, where a most elegant dinner was arranged, on a very large round silver tray, placed on a stool, and surrounded by cushions. The passages we passed were occupied by innumerable black female slaves, and some eunuchs, dressed in all the variety of gay Eastern costume, and forming a curious contrast and a most picturesque back-ground to the ladies and white slaves who surrounded and accompanied us. On either side of the door several ladies, each with an embroidered napkin hung on her right arm, held silver ewers and basins that we might wash our hands before advancing to the table.

No one was admitted to the table but the widow of Toosoon Páshá, the daughter of Mohammad 'Alee Páshá, the mother of Mohammad 'Alee Bey, with ourselves, and a lady of great importance in the East, the foster-mother of 'Abbás Páshá. The place of the younger wife was vacant.

The tray was covered with small silver dishes filled with various creams, jellies, &c., and most tastefully garnished with exquisite flowers. In the centre was a fore-quarter of lamb, on pilâv. I was truly glad, on this occasion especially, that my home habits had been Eastern; had the case been otherwise, a joint of meat to be eaten without knife or fork would have been a formidable object; for, under any circumstances, I should not have anticipated that the widow of Toosoon Páshá, who is also the mother of Abbás Páshá, and who, being the eldest, was the most honoured at table, would have distinguished me as she did, by passing to me, with her own fingers, almost every morsel that I ate during dinner. The mother of Mohammad 'Alee Bey in the same manner distinguished Mrs. Sieder.

The lamb was succeeded by stew; the stew by vegetables; the vegetables by savoury cream, &c., composing an innumerable variety; and each was removed, and its place filled, when perhaps only tasted. Sweet dishes, most delicately prepared, succeeded these in rapid succession; and, with one exception, all were in silver dishes. Ladies attended close to our divan with fly-whisks; behind them about thirty formed a semicircle of gaily-dressed, and, in many cases, beautiful women and girls; and those near the door held large silver trays, on which the black slaves who stood without placed the dishes, that the table might be constantly replenished.

Black female slaves in the houses of the great are not permitted to enter an apartment where are visitors, but black eunuchs, when favourites with their masters, are constantly to be found in the very centre of a high harem.

In presenting the morsels to me, the widow of Toosoon Páshá constantly said, "In the name of God," and these words are always said by the Muslims before eating or drinking. "Praise be to God" is the grace after either.

There is one particularly agreeable custom observed after dinner in the East; each person is at liberty to leave the table when satisfied. To a European it is really a relief to do so, the dishes are so numerous, varied, and rich.

English and Foreign Nettles.—The stinging properties of the British nettles are feeble when compared with those of some Indian species, which are so virulent as to cause the most excruciating pain, and even sometimes death. Leschenault de la Tour gives the following account of the effects of touching the Urtica crenulata, a specimen of which was growing in the Botanic Garden at Calcutta:—"One of the leaves slightly touched the first three fingers of my left hand; at the time I only perceived a slight pricking, to which I paid no attention. This was at seven in the morning. The pain continued to increase: in an hour it became intolerable; it seemed as if some one were rubbing my fingers with a hot iron. Many of the genera have one or two species which produce eatable fruit, though the fruit of the other species of the same genus is unwholesome, an anomaly rarely to be met with in any other order except the Solanaceæ (night-shades); and although the milky juice of most urticaceous plants is poisonous, it affords, in one species, the cow-tree, a wholesome beverage." Besides these, there are other peculiarities characteristic to the order. The leaves, for example, are alternate, and covered with asperities, or with hairs furnished with a stinging secretion; and this stinging property so well exemplified in the common nettle, is participated in by many others whose acridity is intense. A narcotic principle highly developed in the hemp, and the toughness of the fibre of that plant is common to numerous others of the order; while many species furnish caoutchouc of the finest quality.



[The Emperor Otto III.]

THE RÖMER, AT FRANKFORT.

The town of Frankfort-on-the-Maine possesses a very ancient town-house, which derives its name, the *Römer*, from an upper hall, in which the emperors of Germany, called originally *Roman* emperors, feasted after their coronation in the adjoining cathedral. Till within a few years this hall was occupied by a series of busts of German emperors, of about equal value and authenticity to the portraits of the Scottish sovereigns still exhibited at Holyrood. These have been removed, and will be replaced by portraits in an infinitely better taste. The efforts made by a comparatively small town to elevate art, while they at the same time illustrate history and cultivate patriotic feelings, are so creditable, and have been carried into effect so well, that we are induced to notice the results as much from their intrinsic merit as from their affording examples not unworthy of imitation. Engraved copies of these new portraits are now in course of publication in a large folio size, beautifully coloured, under the title of 'The German Emperors, after the Pictures in the Imperial Chamber in the Römer at Frankfort-on-the-Maine, engraved on copper and coloured, with Lives of the Emperors, by Albert Schott.' The printed prospectus to this work affords us perhaps the best account of the motives and plan adopted, and from it we extract the following passages:—

"In the Römer, the ancient town-house of the town of Frankfort-on-the-Maine, yet exists the vaulted chamber which, in the last century, served for the solemn coronation festival of the German Empire, and from the balcony of which the newly consecrated emperor showed himself to the joyous people. On the long walls, close beside each other, are a row of pointed-arched niches, which fill the whole space. Till within a few years were to be seen two uniform rows of busts of the German emperors since Conrad I., with the laurel crown and toga of Cæsar—worthless creations of the seventeenth and eighteenth centuries.

"At the period (1813) when, through the fall of the power of Napoleon over Germany, the long-suppressed feelings of pride and patriotism again broke out in a bright flame, the idea arose of ornamenting this chamber, so rich in elevating recollections, more worthily, and in every niche to place a picture of a German emperor, as large as life and splendidly coloured. The undertaking, however, was not commenced till twenty-five years later, on the 18th of October, 1838, the anniversary of the battle of Leipzig, and now almost all the pictures are finished.

"The pictures, fifty-two in number, extend from Charlemagne to Francis II., and include the whole history of the German Empire. Three and thirty artists, chiefly of Frankfort, Düsseldorf, and Vienna, have been employed upon them. The greater number of these works show, in a creditable manner, the great progress in art which Germany has made within the last thirty years. Actual portraits of all are not to be reasonably expected, as the pictorial art in Germany, and perhaps generally throughout Europe, exhibits few examples of efforts at resemblance before the end

of the thirteenth century, until which time the contemporary representations satisfy us merely in respect to costume and general character. Since Rudolf of Hapsburg, the monuments of some of the emperors are still remaining, from which, even though imperfect, yet presenting the marked features of countenance, the painters of the Imperial Chamber have been enabled to delineate faithful portraits in the present sense of the word. But of the emperors of the last four centuries, we may confidently affirm that the greater number are likenesses, as with the commencement of the modern period more exactitude is found. Even for those emperors for whom the artists had no such assistance, the most strenuous advocate for historical truth may grant his applause, as art has many means, even when the precise features are unknown, of giving to a celebrated man the correct figure. A certain disposition uniformly gives certain features; through a long succession of ancestors a family resemblance is acquired; the exterior, when time has properly developed it, stands in close relation to a man's general character; and the lives of many of the emperors present moments which, as it were, make their whole being physically apparent. It is thus possible, even where the reality is lost, to rescue the truth, and Frankfort will possess a truth-speaking picture-gallery of German history."

In order to show the manner in which the undertaking has been carried into effect, we give the following table of subjects, with their artists:—

Period of reign.	Emperors.	Painters.	Contributed by
768—814	Charlemagne	Philip Veit	Frankfort Art-Union
814—840	Louis the Pious	J. J. Jung	Ditto
840—876	Louis the German	Charles Trost	Senator Reuss and Landamtmann Benkard
876—887	Charles the Gross	Ditto	Frankfort Art-Union
887—899	Arnulph	J. J. Jung, after P. Veit's designs	Senator Reuss and Landamtmann Benkard
899—911	Louis the child, young		
911—918	Conrad I.	Charles Ballenberger	Art Institute at Stade
919—936	Henry I.	J. B. Zwecker	Governors of the Orphan-House
936—973	Otto I.	Philip Veit	King of Prussia
973—983	Otto II.	Adolphus Teichs	Mrs. Nies and J. N. du Fay
983—1002	Otto III.	Joseph Lettegart	Senator Dr. Souchay and his lady
1003—1024	Henry II.	J. D. Passavant	J. D. Passavant
1024—1039	Conrad II.	Lorenzo Clasen	Dusseldorff Art-Union
1039—1056	Henry III.	H. Stilke	Ditto
1056—1106	Henry IV.	Otto Mengelberg	Ditto
1106—1125	Henry V.	P. J. Kiederich	Ditto
1125—1137	Lothaire	E. Bendemann	Baron A. M. von Rothschild
1138—1152	Conrad III.	Dr. Ferd. Fellner	Dr. Ferdinand Fellner
1152—1190	Frederick I., Barbarossa	G. F. Lessing	Senates of Hamburg and Lubeck
1190—1197	Henry VI.	J. B. Zwecker	A patriotic union of citizens of Frankfort-am-Mai
1197—1208	Philip of Swabia	Alfred Rethel	The family of Neufville
1197—1215	Otto IV.	Maurice Oppenheim	Baron A. M. von Rothschild
1215—1250	Frederic II.	P. Veit	Alexander Bernus and Bernus du Fay
1273—1291	Rudolph of Hapsburg	Gustavus Lasinsky	Counsellor Schlosser
1292—1298	Adolphus of Nassau	H. K. A. Mucke	Duke of Nassau
1298—1308	Albert I.	Edward Steinle	Prince Metternich
1306—1313	Henry VII.	P. Veit	Count of Nassau (late King of the Netherlands)
1314—1347	Louis of Bavaria	C. Ballenberger	King of Bavaria
1314—1330	Frederic of Austria	Dr. F. Fellner	Several citizens of Frankfort
1347—1378	Charles IV.	Francis Brentano	The Society of the Evening Circle at Frankfort
1349	Gunther of Schwartzburg	C. Ballenberger	Maurice von Bethman
1378—1400	Wenzel (Wenceslaus)	Wm. Hensel	Senators Newberg, Souchay, and Passavant
1400—1410	Rupert the Palatine	C. Ballenberger	A Bavarian Union, by — Von Mieg
1410—1437	Sigismund	Philip Foltz	Frankfort Art-Union
1438—1439	Albert II.	Jos. Binder	Count von Münch-Bellinghausen
1440—1493	Frederic III.	Julius Hübner	Julius Hubner
1493—1519	Maximilian I.	A. Rethel	Mrs. L. Contard and J. F. Contard-Wichelhausen
1519—1556	Charles V.	Ditto	Art Institute at Stade
1556—1564	Ferdinand I.	John Ender	Emperor of Austria
1564—1576	Maximilian II.	A. Rethel	The Metzler family
1576—1612	Rudolph II.	Charles Hemerlein	Union of patriotic citizens at Mentz
1612—1619	Mathias	Jos. Danhauser	Emperor of Austria
1619—1637	Ferdinand II.	Peter Kraft	Ditto
1637—1657	Ferdinand III.	E. Steinle	Senate of Bremen
1658—1705	Leopold I.	Leopold Kupelwieser	Archduke Francis Charles
1705—1711	Joseph I.	Ditto	Archduke Louis
1711—1740	Charles VI.	— Waldmüller	Emperor of Austria
1742—1745	Charles VII.	M. Heiler	A Bavarian Union, by — von Mieg
1745—1765	Francis I.	Natale Schiavoni	Emperor of Austria
1765—1790	Joseph II.	M. Oppenheim	St. John's Lodge (Freemasons?), Frankfort-am-Mai
1790—1792	Leopold II.	L. Kupelwieser	Archduke Charles
1792—1806	Francis II.	Ditto	Emperor of Austria

The portraits of the emperors are accompanied in the German publication by memoirs of each sovereign, written in a concise and eloquent style by Albert Schott; but as it is as a work of art that the subject is here treated, it will only be necessary to indicate sufficient of the history to show the characteristics of the individuals we have selected, particularly where, as in the present case, the portrait is imaginative.

Otto III. was the son of Otto II. by Theophania, a Grecian princess, and in 983 succeeded his father when only three years of age. After a short but splendid career, his exertions having been mistakenly directed

towards the establishment of an Italian empire, and the latter part of it embittered by feelings of religious remorse, he died at Rome in 1002, of a pestilential fever, while employed in quelling an insurrection in that city.

The artist has represented him in the period of his greatest brilliancy, when about seventeen years of age and the writer gives the following descriptive reasoning on which the characters of feature and form have been chosen:—"Otto was certainly handsome: the son of the beautiful Greek, her speaking mien and eyes lived in him again; while we recognise the German in the light yellowish-red colour of his hair and the down on his young chin; the fair northern skin is embrowned by the sun of Rome, of which we are reminded by the old-fashioned Romish street, the castle of St. Angelo in the background, and the cloudless sky:* the manly ripeness of expression, the earnestness in his beautiful mouth, could scarcely have been otherwise in one so burdened with weighty cares, the son of a race so quickly and strongly developed. That Otto possessed all these advantages, without wanting better qualities, is shown by the lively glow on his cheeks, the mild elevation of the spiritual forehead, the nobleness and lightness of his whole figure. His rank is shown by the golden sphere resting in his left hand, while his right grasps the staff of empire."

We may add, that the originals, though nearly completed, are not yet placed in their proper positions; they are deposited in a separate room, and exhibited to visitors for a trifling fee.

Public Baths for the Working-Classes.—Every one acquainted with the many causes of crime, and who is aware that the only rational hope of effectually suppressing crime, must be in the removal, one by one, of these numerous causes, must look with pleasure on the movement among the working classes, now going on in Edinburgh and elsewhere, to improve the general health by the establishment of public baths. In two ways is sickness found to generate crime; first, by enfeebling a man's powers, it makes the toil of honest industry more severe to him, and exposes him to the temptation of seeking a living by easier, though dishonest means: and secondly, and in a yet more terrible way, by cutting off the lives of virtuous parents in the prime of manhood, it casts their children on the wide world, without parental guidance, and often without adequate support of any kind. How fearfully sickness acts in this manner is shown by the large number of orphan children who are always to be found in prison; and how far an attention to personal cleanliness, combined with other causes, tends to prevent sickness and death, may be conceived by the fact, that although during a considerable part of the past year fever has raged among the poorer classes, both in Edinburgh and Glasgow, yet at the same time in the prisons of these cities, where great regard is paid to personal cleanliness, and where the prisoners frequently bathe, not a single case of fever has originated, nor, when brought in by any prisoner, has the disorder spread to others.—*Mr. Frederick Hill's Ninth Report on Prisons (Scotland).*

Importance of Iron.—Sweden had a still stronger attraction for the warlike tribes from the interior of Asia, who were pressing upon the population of Europe South of the Baltic, and which has been overlooked by the historians who treat of the migrations of mankind from or to the North in the rude ages. Sweden alone had iron and copper for arms and utensils close to the surface of the earth, and, from the richness of the ores, to be obtained by the simplest process of smelting. This natural advantage must, in those ages, have made Sweden a rallying-point for the Asiatic populations coming into Europe from the North of Asia, and from countries destitute of the useful metals in any abundant or easily-obtained supply. To them Sweden was a Mexico or Peru, or rather an arsenal from which they must draw their weapons before they could proceed to Germany. This circumstance itself may account for the apparently absurd opinion of the swarms of Goths who invaded Europe having come from Scandinavia; and for the apparently absurd tradition of Odin or the Asiatics invading and occupying Scandinavia in preference to the more genial countries and climes to the South of the Baltic; and for the historical fact of a considerable trade having existed from the most remote times between Novogorod and Sweden, and of which, in the very earliest ages, Wisby, in the Isle of Gotland, was the entrepôt or meeting-place for the exchange of products. The great importance of this physical advantage of Scandinavia in the abundance of copper and iron, to an ancient warlike population, will be understood best if we take the trouble to calculate what quantity of iron or copper must have been expended in those days as ammunition, in missile weapons, by an ordinary army, in an ordinary battle. We cannot reckon less than one ounce weight of iron, on an average, to each arrow-head; from twenty to twenty-four *drop*, or an ounce and a quarter to an ounce and a half, being considered by modern archers the *proper weight of an arrow*: and we cannot reckon that bowmen took the field with a smaller provision than four sheaves of arrows, or heads for that number. A sheaf of twenty-four arrows would not keep a bowman above ten or twelve minutes; and in an ordinary battle of three or four hours, allowing their arrows might be picked up and shot back in great numbers, we cannot suppose a smaller provision belonging to and transported with a body of bowmen than ninety-six rounds each; which, for a body of four thousand men only, would amount to above fourteen tons' weight of iron in arrow-heads alone. For casting spears or javelins, of which in ancient armies, as in the Roman, more use was made than of the bow, we cannot reckon less than six ounces of iron to the spear-head, or less than two spears to each man: and this gives us nearly two tons' weight more of iron for four thousand men as their provision in this kind of missile. Of hand-weapons, such as swords, battle-axes, halberds, spears, and of defensive armour, such as head-pieces and shields, which every man had, and coats of mail or armour, which some had, it is sufficient to observe that all of it would be lost iron to the troops who were defeated, or driven from the field of battle, leaving their killed and wounded behind; and all had to be replaced by a fresh supply of iron. We see in this great amount of iron or bronze arms, to be provided and transported with even a very small body of men in ancient times, why a single battle was almost always decisive, and everything was staked upon the issue of a single day; and we see why defeat, as in the case of the battle of Hastings and many others, was almost always irrecoverable with the same troops: they had no ammunition on the losing side after a battle. We may judge from these views how important and valuable it must have been for an invading army of Goths, or whatever name they bore, coming from Asia to Europe, to have got possession of Sweden; so important, indeed, that it is reasonable to believe that if ever an Asiatic people invaded Europe north of the Carpathian mountains, the invaders would first of all proceed north along the Vistula and other rivers falling into the Baltic, and put themselves in communication, by conquest or commerce, with the country which supplied their ammunition; and would then issue armed from the North, and break into the Roman empire, and be considered as a people coming originally from some Northern hive. Scandinavia certainly never had food for more human beings than its present inhabitants, and could never have poured out the successive multitudes who, by all accounts, are said to have come in from the North upon the Roman provinces.—*Laing's Chronicle of the Kings of Norway.*

The Origin of Fogs.—The very common but mistaken idea, that the fog which we see of an evening hanging over low meadows, and by the sides of streams, is ascending, arises very naturally from our first observing it in low places, and as the cool of the evening advances, remarking that it ascends to higher land: the fact is, however, not that the damp is ascending, but that from the coldness of those situations they are the first place which condense the before invisible vapour, and as the cold of the evening advances this condensation takes place at a higher level. A large portion of the vapour ascends to the upper regions of the atmosphere, where it cools, and becomes visible to us in the form of clouds; and increasing in density by cooling, they gradually descend nearer to the earth, until at last becoming too condensed by the loss of heat, they fall in rain, to be again returned in endless succession.—*Scientific Phenomena of Domestic Life.*

* These refer to the original painting in the Hall, and are only faintly indicated in the engraving.

LOCOMOTION OF ANIMALS.—No. IX.

The Bat (Cheiroptera).—Bats present locomotive organs of a very peculiar construction. Destined like birds to move in the air, their skeleton is adapted in conformity to that purpose. The bones are light, the body small, the arms and fingers greatly developed, to afford a great number of points for the attachment of the delicate membrane of which the wing is partly composed, as may be observed in the annexed figure of the short-eared bat. The hand of the bat rotates outwards and inwards like the wing of a bird, so that when the wing is folded the little finger lies on the smaller bone of the fore-arm. The thumb is not included in the membrane of the wing, but projects beyond its margin, where it forms a hook for holding objects. The four succeeding fingers support the membranous wing, which when expanded presents an extensive surface for striking the air during flight. The legs are small, twisted, and so weak as to be incapable of supporting the body when on the ground. The toes, terminating in sharp claws, are well adapted for grasping elevated objects, to which the animal suspends itself in an inverted position; by this means it can easily launch itself into the air on the slightest alarm.



As the bat is incapable of chasing and capturing its prey on the ground, and its food is chiefly composed of insects taken on the wing, it requires the attainment of a much greater velocity of movement than it would be able to accomplish by means of its lower extremities, were they even much stronger than they are. It has, therefore, been furnished with a peculiar apparatus adapted to aerial progression, as has been already described. Such being the case, we shall postpone the statement of the principles on which the power of flight in the Cheiroptera depends, until we take into consideration the flight of animals in general.

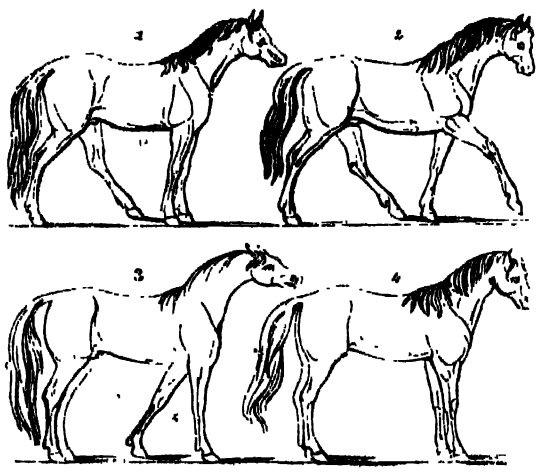
Quadrupeds.—The movements of quadrupeds differ in principle from those of bipeds, and also from those of hexapods.

In all quadrupeds the axis of the trunk is directed more or less horizontally, the angle of inclination depending chiefly on the difference between the length of the anterior and posterior extremities. In some animals—the giraffe, for instance—the fore-legs are the longest, and the axis of the trunk inclines upwards; in others, such as the hare, greyhound, and especially the jerboa and kangaroo, the hinder limbs preponderate in length: the axis consequently (supposing the animal to stand with the four feet on the ground) inclines anteriorly downwards. The difference between the lengths of the anterior and posterior limbs produces a very sensible effect on the movements of such animals.

In quadrupeds the weight of the body is transmitted to the ground by means of their four legs, but we shall find on examination that they do not all bear an equal share of the burden, and that the different species present a diversity of structure which influences their movements very perceptibly. In the elephant, for example, the legs are nearly straight, a conformation which enables the animal to support the mass of its body with the greatest mechanical advantage: but, great as it is well known to be, the strength of the bones and muscles of its legs is far from being in proportion to the mass of its body when compared with that of many smaller quadrupeds; and we consequently find that the speed of the elephant is not proportional to its bulk.

Quadrupeds move their four legs either singly and successively, and in various orders, which correspond with the different velocities of the animal. These different kinds of movement of the legs are known under the terms walking, trotting, galloping, and leaping.

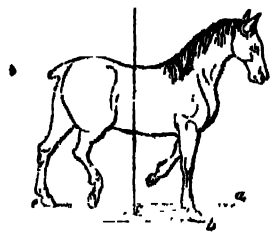
As everybody is familiar with the horse, we shall select that animal to illustrate the manner in which the locomotion of quadrupeds in general is effected. The subject possesses more or less interest to most persons, yet of the millions of people who are in the daily habit of seeing the horse in motion, how very few consider the means by which the movements of that valuable animal are performed. Let us suppose the horse to be standing on its four legs, as in *Fig.* 4, and that it com



mences the walking step by moving its left hind-leg, as in *Fig.* 1; this having been advanced and placed on the ground, the right fore-leg is next raised and advanced, as in *Fig.* 2, and having been placed on the ground, the right hind-leg performs a similar movement, and the legs of the animal are in the position *Fig.* 3; lastly, the left fore-leg is advanced, and placed in the position of *Fig.* 4. These four movements complete the step, and during the series the centre of gravity of the animal passes over a corresponding space. This is the order in which nearly all quadrupeds move their legs in slow walking; but some authors do not coincide in this statement, amongst whom is Borelli, who has figured the horse as moving both the legs on the same side at once in walking, as some horses are taught to do in the *amble*, and as the giraffe is said to do naturally.

A little consideration will clear up the error into which Borelli and others have fallen respecting the horse. It will be observed from the foregoing statement that the left hind-leg moves first; the right fore-leg second; the right hind-leg third; and the left fore-leg fourth. Now if we do not analyse this order of motion from its commencement, we may easily be deceived; for in walking by a horse, the two legs appear indeed to move together on the same side, but this arises from the continuity of the series of movements, which we find begins with the left hind-leg, and terminates with the left fore-leg; being in like manner the movement of the right fore-leg followed by that of the right hind-leg; which continuity of movement, if not carefully discriminated, gives an impres-

sion that the animal moves both legs on the same side simultaneously.



The Trot.—In trotting, the horse moves its legs in pairs diagonally; thus, if the legs *a d* (*Fig.* 5) be raised and advanced first, the legs *b e* will be raised the instant those designated by *a d* reach the ground. On the other hand, when the legs *b e* are raised before the legs *a d* reach the ground, there is a minute interval during which all the legs are raised above the ground at the same time. In trotting each leg moves rather more frequently in the same period of time than in walking, or nearly as 6 to 5. But the velocity acquired by moving the legs in pairs, instead of consecutively, depends on the circumstance that, in trotting, each leg rests on the ground a short time, and swings during a long one; whilst in walking each leg swings during a short period, and rests during a comparatively long one. In walking, the trunk oscillates laterally, whereas in trotting it oscillates vertically; but in each of these kinds of movement there appears to be a slight motion of the trunk of the animal both laterally and vertically.

It may be observed that the vertical line traversing the base of support passes through the horse in such a manner as to leave by far the greater part of the weight of the body to be supported by the two fore-legs.

The Gallop.—In galloping, the horse adopts three different methods of using its organs of locomotion, which are distinguished by the number and the order in which the feet reach the ground.

First order of motion.—When a horse begins to gallop on the right, the left hind-leg reaches the ground first; the right hind-leg and left fore-leg next follow at the same time, and the right fore-leg last. This is called the gallop of three beats.

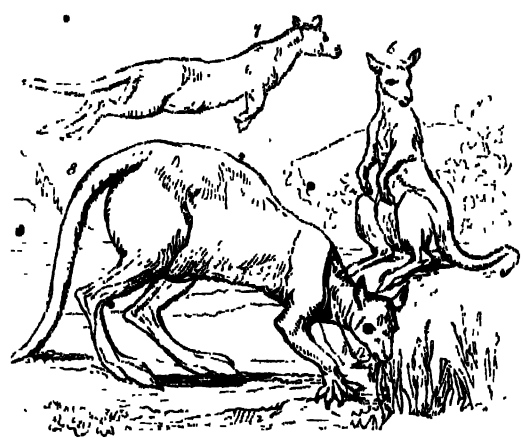
Second order of motion.—If the four legs reach the ground in succession, the left hind-foot reaches the ground first, the right hind-foot second, the left fore-foot third, and the right fore-foot fourth. This is the gallop of four beats, sometimes denominated the canter. This order of movement is not adapted for great speed, but is an agreeable motion in riding on horseback for ladies, or for gentlemen who ride lazily, or badly.

Third order of motion.—In this kind of action the horse moves the legs in the same order as in trotting; that is, the left hind and right fore feet reach the ground simultaneously, then the right hind and left fore feet. This is the order in which the feet move in racing, and whenever the greatest speed is required. It is called the gallop of two beats.

Leaping.—In leaping, the horse raises the fore-legs from the ground, and projects the body upwards and forwards by the hind-legs alone. It is well known that they leap rivulets, hedges, and ditches, with great ease, even under the burden of heavy riders; but to accomplish this an enormous expenditure of muscular action must required; since the muscles which produce the effect act at a great mechanical disadvantage.

Horses which are constituted for great speed have the shoulder-joints directed at a considerable angle with the arm. Saintbell has given the relative proportions of the several parts of the skeleton of the celebrated race-horse Eclipse, together with the angles of inclination and range of motion belonging to the joints of the legs. According to his account, that horse, when galloping at liberty and at its greatest speed, passed over twenty-five feet at each step: these strides were taken two and a half times in a second, being at the rate of about four miles in six minutes and two seconds, or forty miles in an hour and twenty seconds.

Those quadrupeds are best adapted as beasts of burden, or to take long and often repeated journeys, which have the anterior and posterior limbs of nearly equal length, such for instance as the horse, ass, camel, and many other animals, and these have also the power of ascending and descending hills with ease and safety. But such is not the case with those quadrupeds in which the length of the anterior and posterior extremities is remarkably disproportionate. The hare, for example, has the hinder legs much longer than the anterior ones; the consequence of which is, that when pursued, it can often outstrip the greyhound in running up the sides of hills, but in descending it must run in a zigzag direction, or it would tumble over. The rabbit presents the same conformation. In the jerboa and kangaroo the length of the posterior legs predominates exceedingly over that of the anterior, and their mode of progression is effected by a succession of leaps produced by the simultaneous action of their hinder extremities. When pursued, the jerboa is said to clear nine feet at each leap, and so rapidly that the Cossacks, though mounted on the fleetest horses, are unable to overtake it. In these leaps the body flies through the air with the legs inclined backwards as in *Fig.* 7).



In the kangaroo the length of the hind-legs is nearly double that of the fore-legs, which is a disproportion far too great to permit them to move with the same advantage as other quadrupeds. When the kangaroo rests on its four legs, the head and trunk incline to the ground, as seen in *Fig.* 8. They usually sit on the two haunches, using the tail as the third leg of a tripod, as in *Fig.* 6.

Amongst the Ruminantia, the deer and the antelopes are beautifully organized for speed, but as they move on the same principles as the horse, we need not stop to dwell on them.

It may be remarked that those animals which are least furnished with the means of defence, and are least protected, are often endowed with the greatest speed of motion; such as the hare, antelope, deer, &c. On the other hand, the lion, tiger, leopard, and carnivor-

ous quadrupeds which are endowed with great strength, have not the speed of the above-mentioned animals. This shows that with the same number of locomotive organs, the speed of an animal depends on other conditions besides mere strength. The structure of the several joints, the relative length of the different portions of the limbs; the proportion which the length of the limbs bears to that of the body; the angular disposition of the limbs with respect to each other; the distances at which the muscles act with respect to the axes of the joints; all concur to modify the speed of an animal, independently of its muscular power; and these circumstances, the details of which may be found in works on comparative anatomy, vary considerably in different animals. In all the diversified forms of quadrupeds we observe their organization beautifully adapted to fulfil the destiny allotted to them by the all-wise governor of the universe.

THE MINING SYSTEM OF CHILI.

Mr. Darwin the naturalist, in the narrative of his researches in South America, gives some details of the mining system as generally carried on in Chili and other parts of that continent. In an earlier volume of the Magazine we noticed the localities and modes of excavating the chief gold and silver mines: but a few details may here be given, from Mr. Darwin's work, respecting some peculiarities in the South American system generally.

In an old Spanish law in operation in Chili, every encouragement is given to the search for mines. The discoverer may work a mine in any ground, by paying five shillings; and before paying this he may try, even in the garden of another man, for twenty days. There are copper-mines in which the men go through a very hard ordeal for a very small remuneration. They have little time allowed for their meals; and during both summer and winter they begin when it is light, and leave off at dark. (In Chili the summer days are shorter and the winter days longer than in England). They are (at the mines of Jajuel) paid one pound sterling a month, together with food. This food consists of sixteen figs and two small loaves of bread for breakfast, boiled beans for dinner, and broken roasted wheat grain for supper. They scarcely ever taste meat. They have to clothe themselves and to support their families with twelve pounds a year.

But this kind of work is slight to that which is undergone by the men at some mines which were visited by Mr. Darwin, and which had been visited many years before by Sir Francis Head. On arrival at the gold-mines of Yaquil [Jajuel], Mr. Darwin was surprised at the pale appearance of the men; but he soon found sufficient reason for it. The mine is four hundred and fifty feet deep, and each man brings up nearly two hundred-weight of ore. With this load they have to climb up the alternate notches cut in the trunks of trees placed in a zig zag line up the shaft. The men (who are quite naked, except drawers) ascend with this great load from the bottom of the line. Even beardless young men, eighteen or twenty years of age, do this, although they have little muscular development of body.

Sir Francis Head says:—"While the *barreteros*, or miners, were working the lode, the *apires* were carrying the ore upon their backs; and after we had made the necessary observations, and had collected proper specimens, we ascended, with several of these apires above and below us. The fatigue of climbing up the notched sticks was so great, that we were almost exhausted, while the men behind us (with a long stick in one hand, in the cloven end of which there was a candle) were urging us not to stop them. The leading apire whistled whenever he came to certain spots, and then the whole party rested for a few seconds. It was really very interesting, in looking above and below, to see these poor creatures, each lighted by his candle, and climbing up the notched stick with such a load upon his back, though I occasionally was a little afraid lest one of those above me might tumble, in which case we should have all preceded him in his fall. We were quite exhausted when we came to the mouth of the mine; one of my party almost fainted, and as the sun had long ago set, the air was so bleak and freezing, we were so heated, and the scene was so cheerless, that we were glad to hurry into the hut. . . . I then sent out for one of the apires with his load. I put it on the ground and endeavoured to rise with it, but could not, and when two or three of my party put it on my shoulders, I was barely able to walk under it. The English miner who was with us was one of the strongest men of all the Cornish party, yet he was scarcely able to walk with it, and two of our party who attempted to support it were altogether unable, and exclaimed 'that it would break their backs.' The load which we tried was one of specimens which I had paid the apire to bring up for me, and which weighed more than usual, but not much, and he had carried it up with me, and was above me during the whole of the ascent."

Mr. Darwin says, that notwithstanding this severe labour, the apires live entirely on boiled beans and bread; they would prefer the bread alone, but the masters, finding that they cannot work so hard upon this, insist on their eating the beans also. Their pay is from twenty-four to twenty-eight shillings a month. They leave the mine only once in three weeks; when they stay with their families for two days. As a means of preventing the men from abstracting any of the gold or gold-ore (for it is of a gold-mine that Mr. Darwin is speaking), the owners establish a very summary and stringent tribunal. Whenever the superintendent finds a lump of ore secreted for theft, its full value is stopped out of the wages of all the men; so that they are obliged to keep watch over each other, each having a direct interest in the honesty of all the rest.

The Chilian miners are full of peculiarities. The amount of labour they undergo is greater than that of slaves, generally so called; yet as they are to a certain extent masters of their own actions, they bear up against what would wear down most men. Living for weeks together in the most desolate spots, when they descend to the villages on feast-days there is no excess or extravagance into which they do not run. They occasionally gain a considerable sum, and then, like sailors with prize-money, they try how soon they can contrive to squander it. They drink excessively, buy quantities of clothes, and in a few days return to the mines without a penny, there to resume their laborious mode of life. It is observed by Mr. Darwin that this thoughtlessness, as with sailors, is the result of the mode in which they are made dependent upon others rather than on themselves. Their daily food is found them, and they acquire no habitual care as to the means of subsistence; while the temptation to enjoyment and the means of paying for it occur at the same times. Far different is this from the system observed in Cornwall; where the men, by having a direct interest in the good management of the mine, learn to think for themselves, and form a highly intelligent body of men. The Chilian miners wear a peculiar and rather picturesque dress; consisting of a very long shirt, of some dark-coloured baize, with a leathern apron, fastened round the waist by a brightly coloured sash; very broad trowsers; and a small cap of scarlet cloth fitting closely to the head.

It is necessary to bear in mind that the miners here spoken of are a different set of men from the apires,

who are those that bring up the heavy burdens. The miners dig the ore from the bowels of the mine; while the apires are simply labourers, such as the bricklayers' labourers, with whose appearance we are familiar, but who carry much less heavy loads, and up a much less height with a much better constructed ladder. The following remarks by Mr. Darwin will further illustrate the extraordinary kind of labour which these men undergo voluntarily; for voluntary it must be called when viewed in relation to acknowledged slavery, since the men are not obliged to accede to the employer's terms, although in effect the country is so poor and ill-regulated that the men have very little choice. "According to the general regulation, the apire is not allowed to halt for breath, except the mine is six hundred feet deep. The average load is considered as rather more than two hundred pounds, and I have been assured that one of three hundred pounds (twenty-two stones and a half) by way of a trial has been brought up from the deepest mine! At the time the apires were bringing up the usual load twelve times in the day, that is, two thousand four hundred pounds from eighty yards deep; and they were employed in the intervals in breaking and picking ore. These men, excepting from accidents, are healthy and appear cheerful. Their bodies are not very muscular. They rarely eat meat once a week, and never oftener, and then only the hard dry charqui (dried beef). Although with a knowledge that the labour is voluntary, it was nevertheless quite revolting to see the state in which they reached the mouth of the mine; their bodies bent forward, leaning with their arms on the steps, their legs bowed, the muscles quivering, the perspiration streaming from their faces over their breasts, their nostrils distended, the corners of their mouth forcibly drawn back, and the expulsion of their breath most laborious, each time, from habit, they utter an articulate cry of 'ay-ay,' which ends in a sound rising from deep in the chest, but shrill like the note of a fife. After staggering to the pile of ores, they emptied the 'carpacho:' in two or three seconds recovering their breath, they wiped the sweat from their brows, and, apparently quite fresh, descended the mine again at a quick pace. This appears to me a wonderful instance of the amount of labour which habit (for it can be nothing else) will enable a man to endure."

There is a great amount of ignorance manifested among the Chilian and La Plata miners, on points which in England constitute part and parcel of the mining system. At a copper-mine Mr. Darwin was told that the Chilian miners had no conception of the value of copper pyrites (a rich ore of copper) until informed of the circumstance by miners from this country: the Chilians laughed at the English for entertaining such a notion; but the English afterwards turned the laugh against them, by making a profitable use of some veins of this ore, which they had bought for a mere trifle.

The mining system in that country is generally conducted somewhat as follows:—There are two principal persons concerned in almost every mine, the proprietor and the habilitador: the first, who is also the actual miner, lives at his hacienda, or farm, generally in the neighbourhood, and attends to the details of working and melting the ore. The habilitador resides at one or other of the sea-port towns; he is the mining capitalist, by whose means the miner is enabled to proceed with his work. The habilitadors are generally diligent and prudent men; while the proprietor or miner is too often improvident. The proprietor farms his own ground, on the banks of a stream; obtaining from his farm vegetables and sometimes live-stock for the subsistence of his working miners. The melting-house is also generally built on his hacienda, and the ore is brought to his door on the backs of mules. These farmer-miners rarely undertake to work a mine with their own unassisted capital; they are seldom sufficiently wealthy, and when they are so, it is found ultimately more advantageous to share with the habilitador, who takes charge of the commercial part of the business. In some instances, the miner is so utterly without funds that he is at the mercy of the habilitador, who makes what terms he pleases, which the other has scarcely an option to refuse or accept, since he has no means of paying the wages of his men, and carrying on the operations, without the aid of the capital provided by the habilitador.

The Chilian system has, however, undergone a good deal of change by the introduction of English capital and modes of proceeding: although the English capitalists themselves have not had a very flattering return for the money so invested, except in some rare instances.

THE CHAMPAGNE DISTRICTS OF FRANCE.

We have no spots in England analogous to the wine-districts of France. The cultivation of the grape is in too backward a state in this country to allow of the wine-manufacture being brought to an important extent. Perhaps the nearest approach to such a system is exhibited in the cider-districts of Devonshire and Herefordshire, where the inhabitants, for one generation after another, cultivate large orchards of apple-trees for the express purpose of preparing this beverage. In the midland parts of France, however, the wine-system (if we may so term it) exhibits many interesting features worthy of note.

The name of *Champagne*, which is so familiar as that applied to a choice variety of French wines, is the name of one of the provinces into which France was divided before the Revolution. The province has been since subdivided into several "departments," and the old name is not now officially applied to the district; but if nothing else should keep the name of Champagne in remembrance, the wine which is named after it will effectually do so. The district of Champagne lies eastward of Paris, intervening between the metropolis and the country around Strasbourg. Rheims, Epernay, and Château-Thierry, are three of the principal spots in the heart of the wine-district; especially Epernay, on the road from Paris to Châlons-sur-Marne.

For the manufacture of the *white* champagne wines black grapes are generally used. They are gathered in the morning, while the dew is yet on them; and it is remarked that, when the weather is foggy at the time of the vintage, the produce of the fermentation is considerably increased. The wine obtained from the first pressure is called *vin d'élite*, and is always kept apart from the rest. The liquor is collected in small vats, whence it is removed early in the following day into puncheons which have been previously sulphured; in these the *must* undergoes a brisk fermentation, and is allowed to remain till towards the end of December, when it becomes bright. It is then racked, and fined with isinglass, and in a month or six weeks more it is racked and fined a second time. In the month of March it is bottled; after it has been six weeks in bottle it becomes brisk, and towards autumn the fermentation is often so powerful as to occasion a considerable loss by the bursting of the bottles. The loss thus sustained, which is seldom less than twenty per cent., is one of the causes which tend to enhance the price of the wines. To procure *pink* champagne, the grapes are first slightly trodden and freed from the stalks; and the fermentation is allowed to commence before they are subjected to the press, in order to faci-

litate the solution of the colouring-matter. In making the *red* wines, the grapes are trodden before they are introduced into the vat; sometimes the treading is repeated during the fermentation. The marc, or stalky refuse, is covered by a board, and a layer of straw is commonly employed to protect the frothy head from the contact of the atmospheric air.

Miss Costello, in her 'Pilgrimage to Auvergne,' has given many interesting details concerning the Champagne district, which further illustrate the place and its people. Wine-making is deemed such an important part of the industrial arrangements of the district, that pamphlets are continually appearing, as well as works of larger bulk, relating to professed improvements in the method of cultivating the vine, or in the manufacture of the wine. There does not appear, however, to have been much change in the mode of proceeding during half a century. At that time, Arthur Young the agriculturist visited the wine-caves of Epernay, then the property of M. Lasnier and M. Dorsé; and the same caves are now occupied for a similar purpose by M. Moët, a wine-merchant whose name is well known to the connoisseurs in champagne. These wine-caves are quite remarkable, and unparalleled by anything of the kind in England. They form an intricate labyrinth of subterranean passages in some chalk-hills near Epernay. It would take a whole day to ramble all through them, and from one end to the other there is nothing but wine, wine. When Arthur Young visited them, they contained fifty or sixty thousand bottles of champagne; but at the present time M. Moët has the enormous quantity of three millions of bottles of this costly wine there deposited. The wine is kept in the caves three years before being sent out, and the quantity is kept up by renewals as fast as the old wine is removed.

To the same firm of Moët also belongs the vineyard of Hautvilliers, one of the most choice of the wine-producing estates. It was formerly one of the rich possessions of the Benedictines, every trace of whose convent is now swept away, although the vineyard remains in a flourishing state.

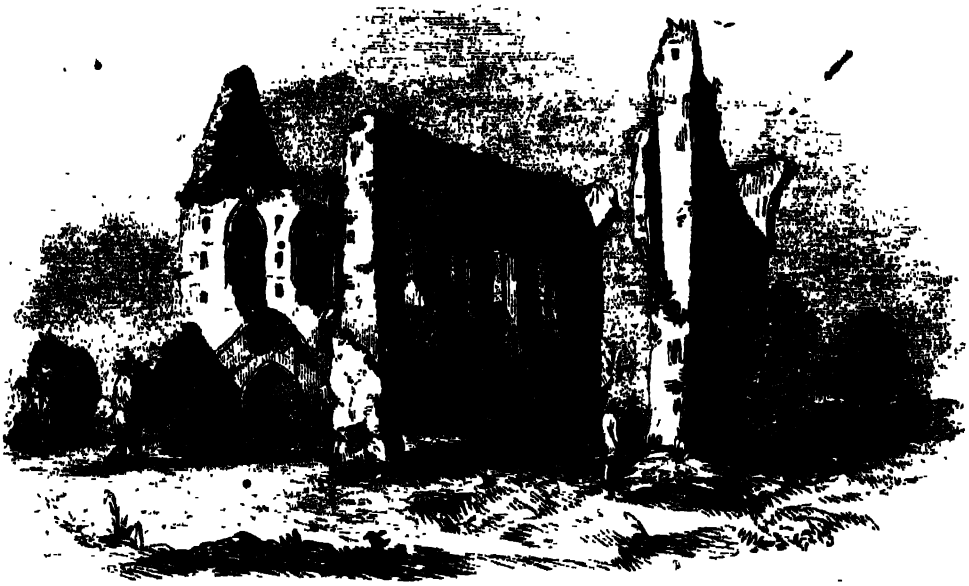
The most advantageous position for planting the vines is on the south-eastern slope of a hill. The summits of hills are too much exposed to winds; while the bottoms of valleys and plains, although fitted for the growth of the wood of the vine, does not answer so well for the ripening of the grapes. In past times very great attention was paid to the choiceness of the growth, in order that this, rather than quantity, should give the reputation to the place. Philippe le Hardi issued an ordinance in 1395, expressed in these words: —"Understanding that on the hill where the best wine in the kingdom is grown, and of which our Holy Father the Pope, our Lord the King, and many other great lords are in the habit, by preference, of making provision, there has been of late planted *gamais*, a bad plant which has many times deceived and defrauded foreign merchants, by which much injury and loss has been sustained, it is hereby ordered that the *déloyal gamais* shall be cut and extirpated in a month from this time, under penalty of a fine of sixty sous each plant."

Those vines are said to be the best which are planted in *cordons* and run on trellises; but many are still grown on single props. It is not uncommon to observe, between the ranks of vines, beans and potatoes; but this is a custom not approved by the best judges. Judicious pruning is regarded as a point of the first consequence, as much so, indeed, as the position of the vineyard or the quality of the plant. The *vigneron*, or vine-dresser, is a husbandman on whose skill much depends; and it often happens that a person so engaged is himself a proprietor of vines: a state of things which sometimes leads to the neglect of his employer's vineyard while attending to his own.

The connexion between the flavour of the grapes and the flavour of the wine is not so close as many might suppose. It does not by any means follow that a grape pleasant to the palate produces a pleasant wine; for, in the course of the fermentation, and of the different operations necessary to bring out the real qualities of the fruit, many minute chemical changes occur, which render the quality of the wine a very uncertain point. The kind of vine called *pinot* is reputed to produce the best wine; yet there are but few champagne vineyards planted with it: because, though the wine is superior, the produce is so small that the expense of cultivation is scarcely compensated by the price. For this reason, this kind of grape is mixed with others of lesser value, to produce what is called *vin pinoté*. If the very finest kind be required, it is necessary to keep all inferior varieties at a distance; for if a pinot-vine be surrounded by inferior plants called troyons, the flavour of the fruit of each will partake of that of the other.

Miss Costello, after speaking of some disasters which the town of Epernay had suffered in the troubled events of former times, remarks:—"The vines, however, flourish through all troubles, and are not only splendid in quality, but beautiful to the eye. Indeed, the whole drive from Epernay to Château-Thierry, which was our next destination, is exquisite, constantly varied and picturesque, and glowing with abundance: corn, vines, and fruit heaping the earth with riches; gardens of roses and orchards of crimson cherries along the road, with every here and there pretty villas belonging to the wine-merchants peeping from their shrubberies, and prospects of extreme beauty opening from the summit of the hills, with the bright Marne winding at their feet."

The Rhône, as well as the Marne, presents its gently sloping hills clothed with vineyards. At a spot about two miles from Valence is the village of St.-Peray, around which are hills on whose slopes an almost uninterrupted vineyard extends, producing very beautiful grapes wherever a south-eastern aspect can be obtained. The grape when ripe assumes a beautiful golden hue; its taste is cloyingly sweet, and the saccharine matter which exudes often covers the branches with a brown stain. From these grapes is produced a sparkling wine of a wholesome quality and a delicate rosy tint. The vintage takes place about the middle or end of September, and the juice is at once transferred to the cask, before the fermentation has begun, and remains there for six or seven months, during which time it is fined. In March or April it is bottled, and remains two or three years to mature, and allow the dregs to deposit. The bottles are piled up in stacks, each row separated by laths, to allow the bottles which burst (and they form fourteen or fifteen per cent. of the whole) to be withdrawn. After this the wine is racked, that is, each bottle is taken out, and is thrust neck downwards into a hole cut in a board. By this means the dregs sink down gradually into the neck; and as they descend, day by day, the bottle is tilted more and more until its position is nearly vertical. To expedite the falling of the sediment, the bottles are lifted and set down with a jerk once or twice a-day; and, after receiving two or three hundred of these jerks, the bottle is taken up, and the sediment is discharged by cutting the string and letting the cork fly, and with it the lees at the neck of the bottle, but as little of the wine as possible. The vacancy thus caused is filled with clear wine; and this process of corking and uncorking is repeated two or three times, until no more sediment is deposited.



[Newark Priory.]

RAMBLES FROM RAILWAYS.

The Adur, Arun, and Wey.—No. VII.

The ridge of downs from Guildford to Farnham, called the "Hog's Back," is very lofty, and affords a series of noble prospects. We have in our paper on the Mole mentioned the same ridge as it extends in the opposite direction between Guildford and Dorking. The whole range from Croydon to Farnham, indeed, may be said to yield a succession of views far surpassing anything else of the kind within the same distance from London.

At Guildford we may leave the Wey for awhile, and rejoin it at Stoke, a delightful little place, with a fine park, and a handsome church in the perpendicular style; the tower is tall, and built of flints and stone; in it is a large door with an elegant window over it. In the church is a monument to the memory of Charlotte Smith, a once popular writer, though now forgotten. The scenery about this neighbourhood, and for some miles farther up the river, is extremely pleasing; we have indeed left the hilly ground, but these meadows are gay and various, and now and then we come upon a neat little cottage, and all along are plenty of trees. The river, too, is enlivened by the occasional passage of a barge, or, what is more picturesque, a timber-raft drawn by a horse or two, and guided by a sturdy steersman, who steps from one to another of the large blocks, and while he skilfully balances himself directs the movements of the raft.

Our river is here separated into several streams, but the towing-path must be followed. We pass by Sutton Place, celebrated for having been visited by Queen Elizabeth, and soon after reach Woking; but there is nothing there need detain us. It is only notable as the nursery of Henry the Eighth. About a mile beyond Woking are the remains of Newark Priory, delightfully situated in a meadow on the left bank of our river. Bishop Tanner, in his 'Notitia Monastica,' says that "at Aldbury, afterwards called Newark, New Place, or De Novo Loco juxta Guildford, in the time of King Richard the First, or before, Ruald de Calver and Beatrix de Sandes his wife, built a church of Black Canons to the honour of the Blessed Virgin Mary and St. Thomas of Canterbury" (rather an odd association by the way). There is nothing authentic known of its history. Tradition relates that the monks liked good living better than fasting; and that the devotional exercises they most delighted in were those they pursued along with the nuns of the convent at Ockham, on the other side of the river. If we may believe the same redoubtable tale-bearer, the monks, in order to facilitate their intercourse with the convent, determined to form a tunnel under the Wey, and thus connect the two establishments. Long and zealously did they labour, and at length they had so nearly completed their work, that all the brotherhood were summoned to be present at the opening of the farther end; when, just as they were under the centre of the river, the water burst in, and they were all drowned. The same story, however, is told of several other priories, and we may hope that it does not properly belong to our Black Canons. This, like the other religious establishments, was broken up at the dissolution by Henry the Eighth. This monarch granted the site of Newark Priory, with most of the adjoining property, to Sir Anthony Browne. It was undoubtedly a fine structure, and is of the early pointed style of architecture. It is in a very dilapidated condition, nearly every trace of ornament being gone. The walls are about three feet thick, and are formed, like most similar edifices in this county and in Sussex, of flint and rubble. The part that remains was no doubt the original priory church; some scattered fragments are supposed to have belonged to the refectory. It is now carefully preserved, but large parts of it are said to have been formerly used for repairing the road, and for any other purposes to which the old flint-work could be applied. These remains, with most of the estates originally granted to Sir Anthony Browne, now belong to Lord Lovelace. Ockham, which we mentioned above, is on the other side of the river. In the church-yard is a punning epitaph on one Spong, a carpenter, who "lived by railing, though he had no wit." As it has been often spoken of,

we give the commencement only; the remainder is rather dull:

"Though many a sturdy oak he laid along,
Fell'd by Death's surer hatchet here lies Spong:
Posts he oft made, yet ne'er a place could get,
And lived by *toiling*, though he had no wit;
Old saws he had, although no antiquarian,
And *stiles* corrected, yet was no grammarian."

The fine mansion at Ockham is the residence of Lord Lovelace, whose Lady is Lord Byron's daughter Ada.

Passing by Wisley, where the Mole and Wey approach within a mile of each other, though they diverge again almost directly, we next reach Byfleet, noted as the residence of Spencer, the author of 'Anecdotes of Pope,' a dull book, and of 'Polymetis,' one that, despite the prodigious prosings of Polymetis, and the everlasting simper of Mysagetes, is rather more amusing, though perhaps hardly meant to be so; he also wrote an 'Essay on Pope's Translation of the Odyssey.' Johnson says of him, in his clever, rough way, "He was a man whose learning was not very great, and whose mind was not very powerful:" a judgment which nobody can deny.

The next place to Byfleet is Weybridge, a large village, without any remarkable feature. Near it is Ham House, an old mansion, with some fine cedars in the grounds. It was given by James the Second to Catherine Sedley, the daughter of Sir Charles Sedley. She afterwards married the Earl of Portmore, whose descendant is still the proprietor of Ham House. The river runs along Oatlands, the seat of Lord Francis Egerton. It formerly belonged to the Duke of York, for whom it was purchased from the Duke of Newcastle. The present building is recent, but the site on which it was erected was formerly occupied by a royal mansion. While it was a royal domain Elizabeth often visited it, and sometimes resided in it. Charles the First settled it on his queen Henrietta. The grounds contain a grotto, said to be the finest in England; it was raised at a great expense by the Duke of Newcastle. In the house there is a good collection of pictures.

The river enters the Thames not far from Walton bridge, and nearly opposite the Coway stakes, where Cæsar is supposed to have crossed the Thames in his second expedition. None of the stakes, we believe, remain now. At Weybridge there is a railway station, from which we may be whirled back to London almost as quickly as if we possessed Fortunatus's cap.

THE ENGLISH AND IRISH ORDNANCE SURVEY.

[Concluded from page 391.]

The Irish Ordnance Survey, to which we next direct our attention, has been a costly affair; but it is one of the noblest gifts that science ever made to a nation. It was intended originally to facilitate certain fiscal arrangements in rating, but its value will continue as long as the country exists, whatever changes may take place in temporary political arrangements.

About twenty years ago, a Committee of the House of Commons recommended to government the appointment of a body of persons to make a complete survey and valuation of Ireland; the former being the ground-work on which the latter was to be conducted. The necessity for this valuation arose out of certain peculiarities in which Ireland differs from England. In England various public expenses are borne or managed by local trusts or committees, under the provisions of especial acts of parliament; but in Ireland they are borne by the counties, through the medium of an assessment called a *cess*. This cess does not press equally on all the proprietors in a county; in some there are townlands which were poor and sterile when the scale of rating was made, but which have grown more valuable without a corresponding increase having been made in the cess payable by them; so that different townlands pay very unequally in regard to their means. Sometimes a townland, which reaped great advantages from having roads made through it, out of the county funds, did not contribute anything towards those funds, because when the apportionment of the rate was fixed this townland was poor and sterile.

About 1824 attention was much directed to the state of the roads, the drainage, the canals, and the river navigation of Ireland: and it was at once seen that an accurate survey of the whole island, with its boundaries both artificial and natural, would greatly facilitate the introduction of improvements in these respects, as well as in respect to a new valuation of the townlands. Accordingly Colonel Colby was directed to suspend for a while his surveying operations in Scotland, and lay the plans for a trigonometrical survey of Ireland on a scale of great completeness. A central office was established at Phœnix Park in Dublin; and Colonel Colby worked out a plan of operation in a manner which none but a military man could devise. There were officers of artillery to superintend large compartments; officers of inferior rank under these; and so on down to the humblest assistants, each one having the most exact and distinct instructions of what he was to do, and where his department ceased. It was a most instructive example of division of labour; there being at times no less than two thousand persons engaged in this object, and all directed by the energies of one mind. The late lamented Lieutenant Drummond entered with such earnestness into this vast enterprise, that he is believed to have hastened his death thereby; for the officers and men who conducted the out-of-door observations were exposed to wet, frost, wind, heat, dew—and all the alternations of a variable climate.

The first important operation was to lay down a base-line, as a commencement to the triangulation. The ground selected was on the shores of Lough Foyle, near Londonderry, where a base-line nearly eight miles in length was laid down. This line is deemed one of the most accurate specimens of measurement yet produced, perhaps the most accurate. As there were reasons for believing that the deal rods, the glass tubes, and the steel chains used in former measurements were all exposed to errors which it was desirable to avoid, Colonel Colby devised an entirely new piece of apparatus. It is known to most persons that there are clock pendulums so formed of two or more different metals, that the unequal expansions of the one and the other shall be made to compensate each other, and leave the effective length of the pendulum unaltered: now Colonel Colby adopted a similar principle in the measurement of his base line. He caused two bars, the one of brass and the other of iron, to be so connected together that two steel pins should be always exactly the same distance apart, whether the bars themselves expanded or contracted; and this distance between the two points was made the unit of measurement along the line. By means of this piece of apparatus, and other contrivances adopted by Colonel Colby, such an extraordinary degree of accuracy has been attained, that it is computed that the error, if any, cannot exceed two inches in a length of eight miles.

The base-line being thus established, the triangulation commenced. The formation of the larger triangles commenced in 1825, and finished in 1832. It was in this part of the undertaking that the powerful oxy-hydrogen light was adopted by Lieutenant Drummond, as noticed in our No. 514. Three elevated points were

selected, within view of each other so far as regarded intervening obstacles, but too far apart to be visible without a very intense light; and to furnish this light was the object of Drummond's apparatus. In one instance, three points were selected distant respectively 101, 93, and 86 miles: and each one of these was made visible from each of the others.

When the whole kingdom was thus divided by enormous triangles, established with all the resources of refined science, these triangles became subdivided into smaller ones, and these again and again subdivided, until a minute network extended throughout the island. The valuators for the townlands required this minuteness of detail, and the surveyors had to keep this matter constantly in view.

In an account which Colonel Colby sent to the government in 1834, is an enumeration of the persons then employed in the actual survey, classed in a very definite manner. There was the colonel-superintendent himself, captains of two different classes, lieutenants of three different classes, civil assistants in seven classes, sappers and miners in two classes, and labourers. The number altogether was about seven hundred; but since then, when draughtsmen and engravers have been added to the list, the number employed has sometimes reached two thousand. The seven classes of civil assistants received from one shilling to eight shillings per day, according to the rank they occupied and the nature of their services.

The survey and the valuation are two distinct operations, the latter being dependent on the former for its data, but independent of it in details. As the survey progressed, certain changes in the laws relating to Ireland rendered desirable a minuteness of survey quite unparalleled in such matters. Not only were the general divisions of the country into parishes, townlands, &c. surveyed, but it was deemed expedient to ascertain the exact limits of estates and farms, the quality of the soil, its natural productiveness, and how far it had been improved by cultivation. But many of these details were of a character which could not be engraved on a map: they were printed in a book. A volume appeared in 1835, relating to the statistics of a portion of the county of Londonderry, as ascertained by the survey. This book is a quarto volume of three hundred pages. It treats first of the "natural state," such as geology, botany, zoology, hills, lakes, rivers, &c.; then of the "artificial state," such as the townlands, antiquities, towns, seats, roads, &c.; and then of the "general state," such as municipality, education, legal institutions, &c. It is perhaps one of the most minute specimens of statistics ever produced: but the expense of continuing such a survey throughout Ireland, and publishing the results, would have been so enormous, that government suspended it, with the exception of the geological portion.

When the British Association held their meeting in Dublin in 1835, the Ordnance Survey and its progress excited much interest. It was stated in one of the public journals at the time, that "To understand the care that has been taken to ensure accuracy, it would be necessary to visit the Ordnance-Office in Phœnix Park, Dublin, and investigate the complicated intellectual machinery by which the detached observations of those employed in the survey are collected and reduced. We use the word 'machinery,' because no other could express the regularity with which the minute division of labour in the several departments is preserved, the strict limitation of every person engaged to his own peculiar branch of business, and the steady union of all in producing a harmonious result." With respect to this division of intellectual labour, it is necessary to remark, that after the surveyors and observers have measured the angles of triangles, calculations have to be gone through to obtain the lengths of the sides of the triangles, which lengths give the distances from place to place; and these calculations are capable, by a little mathematical adjustment, of being brought to such a form that the simplest rules of arithmetic are sufficient for their performance. This humbler species of calculation has been conducted in a singular way. It was stated in the 'Quarterly Review' for 1841, as an indication of the existence of a love of mathematics among the Irish peasantry, that during the Ordnance Survey boys were found in abundance able and willing to work out these calculations at a *halfpenny a triangle*.

We may now briefly notice the Maps resulting from this survey. These maps have been published with much rapidity during the last few years, and the series is approaching towards completion. They are published on the magnificent scale of six inches to the mile; a scale whose magnitude can scarcely be appreciated without taking some particular instance. Let us select, then, the county of Kildare. This county is considerably less than half the size of the county of Kent; and yet the Ordnance map of it occupies no less than forty-two sheets of very large size, probably three feet by two. These maps are especially intended to refer to the townland divisions of the county; but their large scale affords facilities for giving other minute details. It is scarcely too much to say that every tree and every house is separately marked. Either by symbols or by a peculiar engraved character, much information is given in a small space. Besides the parishes, baronies, townlands, cities, towns, and villages, all the parish churches, parks, and seats; all the round towers, forts, ruins, and other antiquities; all the bridges, locks, and weirs of streams and canals; all the mines, quarries, wells, bogs, and collieries; all the tanneries, brick-fields, bleach-fields, forges, and lime-kilns, are represented.

Such is the scale in which other counties are being mapped out. The county of Fermanagh occupies forty-two sheets; Monaghan, thirty-six sheets; Louth, twenty-seven sheets; Donegal, a hundred and twelve sheets; Meath, fifty-five sheets; Leitrim, forty sheets; Sligo and Longford, seventy-eight sheets; Westmeath, forty-two sheets; King's County, forty-nine sheets; Carlow, twenty-eight sheets; Galway, a hundred and thirty-nine sheets; and so on. What the total number will be we do not know; but it is easy to calculate, from the length and breadth of Ireland, that if the whole island be represented in the scale of six inches to the mile (which is now being done), the whole of the sheets connected together would form a map of Ireland a hundred and forty feet high by a hundred and ten in width! This will indeed be a monument of patience and skill.

The sheets of this gigantic map are sold separately, at an office established by the government in Ireland; the purpose being that those who require to obtain a knowledge of any particular district should be able to avail themselves of the Ordnance Survey at a cheap rate. The charge per sheet is from half-a-crown to five shillings, according to the fulness of the details. The maps having a particular object in view, relative to the townland valuation, are engraved chiefly with reference to the boundaries of estates, farms, &c., without reference to the altitudes, depressions, and undulations of the country. But Captain Larcom, at the Cork meeting of the British Association, described a beautiful mode of "contour" engraving, which was calculated to show at once the precise elevation of any spot: it had been partially acted on, and its efficacy shown.



[Hudibras subdued by Trulla.]

HUDIBRAS.—No. VII.

In the affray Ralpho had been unfortunate. He had dismounted to pick up the sword and pistol which the Knight had dropped on being struck by a stone, and before he could remount he and his steed had been attacked and beaten, till

> "The beast was startled, and begun
> To kick and fling like mad, and run,
> Bearing the tough Squire like a sack,
> Or stout King Richard, on his back:
> Till stumbling, he threw him down,
> Sore bruis'd, and cast into a swoon."

As Hudibras had now a little breathing-time, he proceeded to the assistance of Ralpho, who, though recovered from his trance, declares himself unable to rise without the Knight's assistance, who replies that

> "though th' art of a different church,
> I will not leave thee in the lurch,
> This said, he jogg'd his good steed nigher,
> And steer'd him gently tow'rd the Squire,
> Then bowing down his body, stretch'd
> His hand out, and at Ralpho reach'd;
> When Trulla, whom he did not mind,
> Charg'd him like lightning behind."

She had come in the pursuit of her occupation, to plunder the fallen Ralpho, just as the Knight had arrived to his succour, but having by a rapid succession of blows overthrown him also, she becomes magnanimous, and says,

> "But if thou think'st I took thee tardy,
> And dar'st presume to be so hardy
> To try thy fortune o'er afresh,
> I'll wave my title to thy flesh,
> Thy arms and baggage, now my right;
> And if thou hast the heart to try't,
> I'll lend thee back thyself a while,
> And once more for that carcass vile,
> Fight upon tick."

Hudibras accepts the offer, though with many expressions of contempt, and an assurance that he will give her no quarter, the combat then commences:—

> "she to her tackle fell,
> And on the Knight let fall a peal
> Of blows so fierce, and press'd so home,
> That he retir'd, and follow'd 's bum:"

Stung with the disgrace, he, however, recovers himself, and

> "rais'd his arm
> Above his head, and rain'd a storm
> Of blows so terrible and thick,
> As if he meant to hash her quick.
> But she upon her truncheon took them,
> And by oblique diversion broke them,

Waiting an opportunity
To pay all back with usury,
Which long she fail'd not of, for now
The knight with one dead doing blow
Resolving to decide the fight,
And she with quick and cunning slight
Avoiding it, the force and weight
He charg'd upon it was so great,
As almost sway'd him to the ground:
No sooner she th' advantage found,
But in she flew; and seconding
With home-made thrust the heavy swing,
She laid him flat upon his side;
And mounting on his trunk a-stride,
Quoth she, I told thee what would come
Of all thy vapouring, base Scham.
Say, will the law of arms allow
I may have grace and quarter now?
Or wilt thou rather break thy word,
And stain thine honour, than thy sword?
And man of war to damn his soul,
In basely breaking his parole;
And when before the fight, th' hadst vow'd
To give no quarter in cold blood:
Now thou hast got me for a Tartar,
To make me 'gainst my will take quarter;
Why dost not put me to the sword,
But cowardly fly from thy word?
 Quoth Hudibras, the day 's thine own;
Thou and thy stars have cast me down;
My laurels are transplanted now,
And flourish on thy conqu'ring brow:
My loss of honour 's great enough,
Thou need'st not brand it with a scoff:
Sarcasms may eclipse thine own,
But cannot blur my lost renown:
I am not now in fortune's power,
He that is down can fall no lower.
The ancient heroes were illustrious
For being benign, and not blustrous
Against a vanquish'd foe; their swords
Were sharp and trenchant, not their words;
And did in fight but cut work out
T' employ their courtesies about.
 Quoth she, altho' thou hast deserv'd,
Base Slubberdegullion, to be serv'd
As thou didst vow to deal with me,
If thou hadst got the victory;
Yet I shall rather act a part
That suits my fame, than thy desert.
Thy arms, thy liberty, beside
All that 's on the outside of thy hide,
Are mine by military law,
Of which I will not bate one straw:
The rest, thy life and limbs, once more,
Tho' doubly forfeit, I restore.
 Quoth Hudibras, it is too late
For me to treat, or stipulate;
What thou command'st, I must obey
Yet those whom I expugn'd to day,
Of thine own party, I let go,
And gave them life and freedom too;
Both dogs and bear, upon their parole,
Whom I took pris'ners in this quarrel.
 Quoth Trulla, whether thou or they
Let one or other run away,
Concerns not me; but was 't not thou
That gave Crowdero quarter too?
Crowdero, whom, in irons bound,
Thou basely threw'st into Lob's pound,
Where still he lies, and with regret
His generous bowels rage and fret:
But now thy carcass shall redeem,
And serve to be exchang'd for him."

The Knight submits, lays his weapons and his gar-



[The Knight and Squire conveyed to the Stocks.]

ments at the feet of his conqueror, who in contemptuous return throws her own "mantle" over his shoulders.

"And as the French we conquer'd once,
Now give us laws for pantaloons,
The length of breeches, and the gathers,
Port-cannons, perriwigs and feathers;
Just so the proud insulting lass
Array'd and dighted Hudibras."

She, however, most vigorously defends him from the attack of her re-assembling comrades, who threaten to cudgel him to death, and insists on carrying into effect her resolution of redeeming Crowdero from the stocks, and substituting for him both Knight and Squire. They readily agree to the proposition, and proceed to carry it into effect; mounting their prisoners backwards on their horses:

"Orsin led Hudibras's beast,
And Talgol that which Ralpho prest;
Whom stout Magnano, valiant Cerdon,
And Colon waited as a guard on;
All ush'ring Trulla in the rear,
With th' arms of either prisoner.
In this proud order and array
They put themselves upon their way,
Striving to reach th' inchanted castle,
Where stout Crowdero in durance lay still,
Thither with greater speed than shows
And triumph over conquer'd foes
Do use to allow; or than the bears,
Or pageants borne before Lord Mayors
Are wont to use, they soon arriv'd
In order, soldier-like contriv'd;
Still marching in a warlike posture,
As fit for battle as for muster.
The Knight and Squire they first unhorse,
And bending 'gainst the fort their force,
They all advanc'd, and round about
Begirt the magical redoubt.
Magnan' led up in this adventure,
And made way for the rest to enter.
For he was skilful in black art,
No less than he that built the fort;
And with an iron-mace laid flat
A breach, which straight all enter'd at;
And in the wooden dungeon found
Crowdero laid upon the ground.
Him they release from durance base,
Restor'd t' his fiddle and his case,
And liberty, his thirsty rage
With luscious vengeance to assuage:
For he no sooner was at large,
But Trulla strait brought on the charge,
And in the self-same limbo put
The Knight and Squire, where he was shut.
Where leaving them in Hockly i' th' Hole,
Their bangs and durance to condole,
Confin'd and conjur'd into narrow
Enchanted mansion to know sorrow,
In the same order and array
Which they advanc'd, they march'd away."

The mob having dispersed, the Knight begins to solace himself and his companion—

"with ends of verse
And sayings of philosophers.
Quoth he, th' one half of man, his mind,
Is, *sui juris*, unconfin'd,
And cannot be laid by the heels,
Whate'er the other moiety feels.
'Tis not restraint or liberty,
That makes men prisoners or free;
But perturbations that possess
The mind, or sequanimities.
The whole world was not half so wide
To Alexander, when he cry'd
Because he had but one to subdue,
As was a paltry narrow tub to
Diogenes; who is not said
(For ought that ever I cou'd read)
To whine, put finger i' th' eye, and sob,
Because h' had ne'er another tub.
The ancients make two sev'ral kinds
Of prowess in heroic minds,
The active and the passive valiant;
Both which are *pari libra* gallant:
For both to give blows, and to carry,
In fights are equinecessary:
But in defeats, the passive stout
Are always found to stand it out
Most desp'rately, and to out-do
The active, 'gainst a conqu'ring foe.
Tho' we with blacks and blues are suggill'd,
Or, as the vulgar say, are cudgell'd:
He that is valiant, and dares fight,
Tho' drubb'd, can lose no honour by't.
Honour 's a lease for lives to come,
And cannot be extended from
The legal tenant: 't is a chattel
Not to be forfeited in battle.
If he, that in the field is slain,
Be in the bed of honour lain,
He that is beaten may be said
To lie in honour's truckle-bed.
For as we see th' eclipsed sun
By mortals is more gaz'd upon,
Than when, adorn'd with all his light,
He shines in serene sky most bright:
So valour, in a low estate,
Is most admir'd and wonder'd at."

These opinions, however, beget a reply from Ralpho, who takes the opportunity of sneering at the Presbyterian opinions of the Knight, who in return attacks those of the Independents, in which dispute, on both sides is introduced much of the polemical subtleness, wire-drawn inferences, school learning, and fanatical zeal, which distinguished the writers of all sects at that period, but adorned with humorous illustrations and a fertility of wit, that is and ever has been inimitable. The last speech of Ralpho, indeed, vividly describes the characteristics of much of the theological controversy then carried on:—

"Quoth Ralpho, nothing but th' abuse
Of human learning you produce:
Learning, that cobweb of the brain,
Profane, erroneous and vain;
A trade of knowledge as replete
As others are with fraud and cheat:
An art t' incumber gifts and wit,
And render both for nothing fit;
Makes light unactive, dull, and troubled,
Like little David in Saul's doublet:
A cheat that scholars put upon
Other men's reason and their own;
A fort of error to ensconce
Absurdity and ignorance,
That renders all the avenues
To truth, impervious and abstruse,
By making plain things, in debate,
By art perplex'd and intricate:
For nothing goes for sense, or light,
That will not with old rules jump right:
As if rules were not in the schools
Deriv'd from truth, but truth from rules.
This pagan, heathenish invention
Is good for nothing but contention.
For as in sword and buckler fight,
All blows do on the target light:
So when men argue, the great'st part
O' th' contest falls on terms of art,
Until the fustian stuff be spent,
And then they fall to th' argument."

To which the Knight makes a short reply, concluding—

"therefore let 's stop here
And rest our weary bones awhile,
Already tir'd with other toil."

ENGINEERING AMONG THE ALPS.

The Alpine districts of Switzerland have been the scene of many bold engineering exploits, having reference principally to the construction of roads where none existed before, and to the making of bridges over torrents and ravines of fearful depth. Many of these roads will be numbered among the greatest and most valuable of Napoleon's projects, when the turmoil of politics has subsided.

In order to understand the nature and object of these Alpine roads, it will be necessary to bear in mind the nature of the barrier which separates Switzerland from Italy. The Alps which form this barrier are in themselves too lofty to be crossed by any road, and too steep to be ascended by any vehicles; but there are depressions in valleys between the mountains, which, though lofty and difficult, are less so than the peaks themselves; and along the valleys, or 'passes,' the roads have been constructed which form the only media of communication from Central Europe to Italy. From the time of Hannibal down to that of Napoleon, military conquerors have had to traverse one or other of these routes, before they could bring the armies of the north to bear upon Italy, or those of Italy to attack their northern neighbours. There are about fifty of these passes in that portion of the Alps contiguous to Switzerland. The greater part of these are either bridle-paths or mere footpaths; another portion, smaller in number, are good enough to be traversed by the light char-à-banc, a single-horse vehicle much used in Switzerland; while there are seven or eight in which great engineering skill has been shown, in the construction of high roads fitted for the transit of heavy carriages.

One of the most ancient specimens of engineering, in connexion with the Alpine roads, is the *Cornice*, a road forming the customary route from Nice to Genoa, close to the Mediterranean. This is not so much one of the passes between the Alps, as a road by which they may be avoided altogether; since it is carried all along between the mountains and the sea. This was the earliest passage frequented by the Romans; it was by them called the Via Aurelia, or Aurelian Road, and was the first which they carried out of Italy beyond the Alps. The name of the Cornice seems to have been given to the road, because it is in many places a mere ledge cut in the sides of the mountains which overhang the sea. It is carried along the shore, round capes, and follows the windings of the coasts and of the mountains near them. Having the deep blue waters of the Mediterranean on the one side, and the rugged elevations of the Alps on the other, this road is peculiarly rich in picturesque scenery, which has engaged the pencils of many of our artistic tourists.

The passes between the Alps are the scene of much more difficult engineering than the Cornice road. On spots where the steep and hard surface of the cliff had left hardly an inch of space for a goat to climb along, roads have been constructed upon high terraces of solid masonry, and through a gap, or notch, blasted by gunpowder, in the wall of the rock. In many instances, where a projecting buttress of the mountain had blocked up all passage for ages, a tunnel, or gallery, has been pierced. In other instances, where such a barrier occurred, the engineer threw a bridge over the torrent or gorge, and carried his road along the opposite side. When the road reaches a spot where avalanches are likely to occur, it is carried in subterranean galleries driven through a mountain, or is sheltered by massive arcades of masonry nearly a mile in length. Such is the general character of these undertakings, a few instances of which we proceed to notice.

The Gemmi Pass is not provided with one of the larger roads, but yet exhibits at one particular spot a striking example of the seemingly perilous routes taken by the mules and their drivers. Near the summit of the pass is a precipice so nearly vertical, that a plumb-line sixteen hundred feet in length, if suspended from the top, would scarcely touch the sides. Along the face of this stupendous vertical wall, a road was constructed about a century ago. This path was cut out of the rock itself, or formed upon artificial supports, according to the sinuosities of the rock; it is from three to five feet in width, and has a protecting wall on the outer side. On approaching this spot, the rock itself is so vast, and the road so small, that a traveller can see no way before him, and is apt to think that all outlet from the valley is cut off, until he comes actually close to this path. The path itself is a mere ledge—a mere groove cut in the face of the cliff, from which the traveller may look down to a depth of many hundred feet. Infirm or timid persons are carried along this path on men's shoulders, in a sort of litter.

The Via Mala, one of the most terrible defiles in the Alps, was the scene of some very skilful engineering on the part of an Italian engineer named Pocobelli. It occurs at one part of the Pass of the Splügen. It is a cleft in the mountain, from one to two thousand feet in depth, and in some places not more than ten yards wide. The Rhine, compressed within very narrow limits, rushes along the bottom of this cleft. The walls of rock on both sides are almost perpendicular; there is not an inch of pathway or shore between the river and the rock, and hence this used to be an impassable spot. The Germans gave it the name of the Verlorenes Loch; the French called it the Trou Perdu; while its classical name of Via Mala, like the other two, conveys the idea of a lost or unlucky path. Travellers used to make a wide detour, clambering over mountains and through valleys, in order to surmount the four miles of distance which forms the Via Mala. Thus it remained till Pocobelli made a capital road through the gorge itself. He pierced the projecting buttresses of rock with galleries or tunnels, a work of great labour from the intense hardness of the rock; and he gained the requisite width of the carriage-road in the face of the rock by blasting a notch as it were in the mountain itself. For more than a thousand feet the road is carried along beneath a stone canopy thus artificially hollowed out; and it is protected on the outer side by a stone wall. The road crosses the gorge three times, by as many bridges, at spots where the contour of the rocks rendered this course desirable. Between the first and second of these bridges, the chasm assumes such an extraordinary form that the precipices on the one side actually overhang those on the other, on account of the obliquity of the cleft. Beyond the second bridge the road is scooped out of the face of the rock, and the defile is here not more than eight yards wide; but in approaching the third or upper bridge the defile increases in width, and becomes less difficult in its character.

In another part of the same general pass of the Splügen, the Austrian government has employed the services of an engineer to make a practicable road where nothing but a bridle-path existed before. This is a curious example of the energy which competition induces. The Swiss made a good carriage-road over the Bernardine Pass, which threatened at once to draw off all the traffic from the Splügen Pass; whereupon the Austrians set to work promptly, and made the Splügen road far better than it was before. There are on this new line of road three distinct galleries cut

through the solid rock, one of which is six hundred feet long, another seven hundred, and the third more than fifteen hundred, all of them being fifteen feet high, and the same in width. These galleries are constructed of the most solid masonry, arched with roofs which slope outwards to turn aside the snow, and supported on pillars, or low windows like the embrasures of a battery—a mode of arrangement necessary to protect the road from falling avalanches.

Perhaps the finest example of these Alpine roads is that over the Pass of the Simplon. This is, as to geographical position, one of the most important of the Swiss passes, it having been constructed by Napoleon after the battle of Marengo, his own difficulties in crossing the Great St. Bernard having shown him how desirable such a road would be. The plans and surveys by which the direction of the road was determined, were made by M. Céard. Operations were commenced on the Italian side of the Simplon in 1800, and on the Swiss side in 1801. It took six years to complete, and there were at times as many as thirty thousand men simultaneously engaged on it. It includes the enormous number of six hundred and eleven bridges; it has terraces of massive masonry many miles in length; it has ten galleries, either cut out of the solid rock or built of stone; and it has twenty houses of refuge to shelter travellers, and to lodge the labourers constantly employed in taking care of the road.

Between the first and second maisons de refuge the road skirts the verge of a precipice, at the bottom of which the torrent is seen at a vast depth; and a little farther on the traveller sees, high above his head, the glaciers under which the road is carried. Near this is a bridge which the engineers formed so as to present the smallest possible surface to the wind, as the ravine is subject to avalanches, which are accompanied by winds of irresistible force, calculated to throw down almost any structure. The first gallery occurs near the fourth refuge: just beyond this is a scene which is described as "a picture of desolation. The eye wanders over snow and glacier, fractured rock and roaring cataract, relieved only by that stupendous monument of human labour the road itself, winding along the edges of precipices, penetrating the primeval granite, striding over the furious torrent, and burrowing through dark and dripping grottoes, beneath accumulated masses of ice and snow."

Between the fifth refuge and the summit of the pass there is a portion, about two miles in length, so much exposed to the visitations of avalanches, that places of shelter are more numerous than in any other part of the road; there being three galleries, two maisons de refuge, and one hospice within this distance. These galleries, from the extraordinary position which they occupy among the vast fields of ice, are called the "glacier galleries," they are partly excavated, and partly built of strongly arched masonry; and, by an ingenious arrangement on the part of the engineer, they serve in places as bridges and aqueducts at the same time, the torrents being conducted over and beneath them.

Shortly beyond this spot the road reaches the summit of the pass, where is a hospice fitted up expressly for the relief of travellers in inclement weather; it is inhabited by a few Augustine monks, who are attended by some of those valuable and intelligent dogs of which so many accounts have been written in reference to the Hospice of St. Bernard. The road now begins [illegible] and soon reaches the first gallery or

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side; beyond which it enters a
he Gorge of Gondo, where the
at mid-height, between a pre-
isle and a chasm on the other

A gallery here occurs, cut through rocks of such excessive hardness that it required the incessant labour of more than a hundred workmen, in gangs of eight relieving each other day and night, to pierce a length of six hundred feet in eighteen months. The miners were at two places suspended by ropes to the face of a perpendicular rock, where they wrought side-openings into the tunnel.

Such are some of the works in this great line of engineering enterprise; and they will afford an idea of the remainder. Sir James Mackintosh once said of this road over the pass:—"The Simplon may be safely said to be the most wonderful of useful works, because our canals and docks surpass it in utility, science, and magnitude, but they have no grandeur to the eye. [Some of the railway viaducts and cliff-works, constructed since Sir James wrote, *have* grandeur to the eye.] Its peculiar character is, to be the greatest of all those monuments that at once dazzle the imagination by their splendour, and are subservient to general convenience." Mr. Rogers, too, has pictured the scene in the following lines:—

"O'er the Simplon, o'er the Splügen, winds
A path of pleasure. Like a silver zone,
Flung about carelessly, it shines afar,
Catching the eye in many a broken link,
In many a turn and traverse as it glides;
And oft above and oft below appears,
Seen o'er the wall by one who journeys up,
As though it were another, through the wild
Leading along, he knows not whence or whither!
Yet through its fairy course, go where it will,
The torrent stops it not, the rugged rock
Opens and lets it in, and on it runs
Winning its easy way from clime to clime,
Through glens lock'd up before."

Notwithstanding all the precautions taken in the construction, the Simplon road has been subject to occasional devastating inundations. In 1834 there was such a combination of avalanche, torrent, and storm, that the road for eight miles was nearly carried away; stone bridges were swept away, galleries and tunnels were filled with water, and a scene of desolation ensued which cost years of expense and labour to repair.

[To be continued.]

Superstitions of Scotch Fishermen.—The reader must be familiar with the old Norse belief, so poetically introduced in the 'Pirate,' that whoever saves a drowning man must reckon on him ever after as an enemy. It is a belief still held by some of our northern fishing communities. We have oftener than once heard it remarked by fishermen, as a strangely mysterious fact, that persons who have been rescued from drowning regard their deliverers ever after with a dislike bordering on enmity. We have heard it affirmed, too, that when the crew of some boat or vessel have perished, with but the exception of one individual, the relatives of the deceased invariably regard that one with a deep irrepressible hatred. And in both cases the elicited feelings of hostility and dislike are said to originate, not simply in grief, embittered envy, or uneasy ingratitude, but in some occult and supernatural cause. There occurs to us a little anecdote, strikingly illustrative of this kind of apotheosis (shall we call it?) of the envious principle. Some sixty years ago there was a Cromarty boat wrecked on the rough shores of Eathie. All the crew perished, with the exception of one fisherman; and the poor man was so persecuted by the relatives of the drowned, who even threatened his life, that he was compelled, much against his inclination, to remove to Nairn. There, however, only a few years after, he was wrecked a second time, and, as in the first instance, proved the sole survivor of the crew. And so he was again subjected to a persecution similar to the one he had already endured, and compelled to quit Nairn, as he had before quitted Cromarty.—*North British Review.*



[Bangor Cathedral.]

BANGOR CATHEDRAL.

"On the first establishment of Christianity in Britain," says the Rev. J. Evans ('Beauties of England and Wales'), "the particular assemblies of people for the purpose of divine worship were designated by the appellation *côr*, a circle, society, or class. These côr-au afterwards received the name of their respective evangelical instructors, as côr-Fybi, côr-Illtud, côr-Deiniol, &c. When any one of these was invested with paramount authority over certain others, it assumed the distinctive name of Ban-côr, or the supreme society." Hence the present BANGOR. The cathedral stands in a narrow fertile vale, at the base of a steep rock; the city, founded by Maelgyn Gwynedd, a sovereign of North Wales, as early as the sixth century, forms but one narrow crooked street, of a mile in length, with openings to the water-side. This Maelgyn had rendered himself notorious by his guilty life, and, anxious to make his peace with God and his offended people, he left his throne and government, and became a penitent recluse in the monastery that had a few years before (in 525) been founded by Deiniol or Daniel, son of the Abbot of Bangor Iscoed, as a cell to his father's house; but which afterwards became so much more famous than its parent, as to be distinguished from it by the appellation *mawr*, or great. But the first novelty of this change over, Maelgyn soon grew disgusted with a life so opposed to all his previous habits, and once more went back to his old excesses, and persevered in them to the last. To appease, probably, his own conscience, silence his murmuring subjects, and at the same time soothe Deiniol, he caused him, as the founder of the monastery, to be made a bishop; the convent church, then a Cathedral, to be flatteringly dedicated to him; and bequeathed some few lands with certain franchises to the chapter. Such was the origin of the diocese of Bangor, its constitution, and revenues (never very great). In 1118 Archbishop Baldwin and Giraldus de Barri, the preachers of the Crusades, came to Bangor, through a serpentine ravine that fatigued them excessively; the archbishop sat down on an oak torn up by the violence of the winds, and began to be very amiable and pleasant with the Crusaders who accompanied him, when the sweet notes of a bird in a wood adjoining led to a discussion as to what bird it was. "The nightingale was never heard in this country," it was observed; the archbishop significantly smiling, replied, "The nightingale followed wise counsel, and never came into Wales; but we, *unwise* counsel, who have penetrated and gone through it." After being rested and refreshed in Bangor by Guy Ruffyns, the bishop, Archbishop Baldwin celebrated mass in the Cathedral, and, "more importunate than persuasive," compelled him to take the cross, amid the general lamentation of his people, who seemed broken-hearted at the prospect of his departure from them. (Hoare's 'Giraldus.') In the Cathedral, built in 1102 (the previous one was destroyed at the Conquest), that characteristic scene occurred, in which King John, irritated by opposition to his rapacity, displayed his violent and tyrannic disposition by seizing the Welsh bishop as he was officiating at the altar. A handsome ransom procured the bishop's release, for money was John's prime object, especially as the discovery had been forced on him, in the course of several visits to Wales, that it was far easier in his rage to vow the extermination of the whole Welsh race, than to fulfil that vow when it was made. In the revolt of Owen Glendwr, 1402, Bangor Cathedral was once more reduced to a wreck, and so remained during nearly a century. The choir was then rebuilt by Bishop Dean, and the tower and nave by his successor, Bishop Skeffington, in 1532. The next bishop, Bulkeley, alienated much of the church property, and, says Godwin, "having sacrilegiously sold away five bells out of the steeple of his Cathedral, and going to see them shipped off, he was on his return homewards struck with blindness, insomuch that he never saw afterwards." This can hardly be true, or the bishop must have possessed extraordinary faculties, for there are many writings of his in existence dated during the years of his supposed deprivation of sight. The present condition of the Cathedral is attributable to Dr Warren, its liberal improver at the beginning of the present century. Several ancient Welsh princes, besides many bishops and ecclesiastics, have been buried here. The most interesting sepulchral relic is a tomb of Prince Owen Gryffydd, in an arched recess.

ENGINEERING AMONG THE ALPS.

[Continued from p. 403.]

The Alpine roads which we noticed in the former article as specimens of engineering, are so far representatives of the whole class as to render much further description unnecessary: a few words may, however, be said respecting the pass of Mount Cenis, one of those which Napoleon made into a good carriage-road.

The Emperor Charlemagne crossed the Mount Cenis with an army about a thousand years ago, and established an hospice there. The pass continued to be one of the roads from France into Italy, but was of a very imperfect character until Napoleon employed the engineer Fabbroni upon it. The road now constructed is a succession of zigzags, laid out so as to render the ascent and descent as easy as possible. There are twenty-three houses of refuge established along the road, occupied by *Cantonniers*, whose duty is to take care of the road and to assist travellers. Each house is numbered. At No. 20 several sledges are kept; and in winter, when deep snow covers the inequalities on the sides of the mountains, travellers descend the slope by these sledges. The other parts of the road do not involve so many heavy engineering works as the Simplon; yet so large was the undertaking, that it occupied from 1803 to 1810 to complete it, and cost nearly three hundred thousand pounds.

Another class of engineering projects carried out in these mountainous districts relates to various hydraulic works connected with the draining of lakes or of flooded districts, and the cutting of canals for carrying off water in various ways. A remarkable example of this was noticed in a former number of the Magazine (757), in which attempts were made to remove a body of water which had been dammed up by an obstacle to its free current. Another example of a mode of draining a Swiss lake may here be described.

Near the Valley of Sarnen in Switzerland is the Lake of Lungern. This was formerly a sheet of water fringed at its margin with beautiful woods, and partly enclosed by steep banks. About fifty or sixty years ago, the inhabitants on the shores, thinking that they might acquire five hundred acres of good rich land at the expense of the lake, devised a plan for so doing. The engineer who undertook it proposed to drain off part of the water by a tunnel, so as to lower the surface of the lake many feet, and thus lay dry an available strip of land all round the shores.

In 1788 the engineer began the boring of a tunnel through the Kaiserstuhl, a ridge which divides Lake Lungern from Lake Sarnen, and which prevented the water of the former from flowing into the latter. The tunnel was commenced at the lower end, near Lake Sarnen, and was worked obliquely upwards towards the upper lake. But a difficulty then arose as to the breaking of the tunnel finally into the upper lake in such a way as to prevent the lower country being flooded by the violent and sudden outpouring of water through the tunnel. Sulzberger, the engineer, with a view of avoiding too sudden an outburst, proposed to bore a number of small holes with an auger through the wall of rock which now alone intervened between the tunnel and the water in the upper lake; and to close these perforations with cocks which might be opened and shut at pleasure. A boring-rod, twelve feet in length, driven through the rock, was followed by a discharge of mud and water, and a blow struck with a hammer by the miner from within was reverberated on the surface of the water in the lake.

The engineer, however, now discovered that the friable nature of the intervening rock, and the clay and sand above it, rendered impracticable the plan of draining the lake by a number of small perforations. He therefore determined to blow out the whole of the intervening barrier with gunpowder, since no miners could run the hazard of working in the tunnel till a large perforation was made. He enlarged the inner end of the tunnel, so as to make it a square chamber approaching to within six feet of the bed of the upper lake. Into this chamber he placed about a thousand pounds' weight of gunpowder, together with a fusee or port-fire to extend to the other end of the tunnel. The cask was rammed tightly in with sand on every side, to prevent it from exploding towards the mouth of the tunnel. These operations were exceedingly difficult on many accounts: the cask was nearly as large as the tunnel itself, and great labour was necessary in getting it up into its place; the air was so foul by the breathing of many labourers in a small space, that the lights were extinguished; while the constant influx of water, flowing through small fissures from the lake above, threw more difficulties in the way. The men could only work in this confined place a few hours at a time; and five hundred of them were required to keep the works in progress.

The length of the tunnel was about thirteen hundred feet. Strong flood-gates were erected at the lower end to stem the impetuosity of the current; and preparations were made for firing the blast on a given day. All being ready, on the morning of January 9, 1836 (for the earlier attempts had been abandoned and renewed, and abandoned again), two cannon-shots from the neighbouring hills announced to the inhabitants of the valley what was about to happen. A bold miner was despatched to fire the match, which was previously arranged to be of such a length as to allow the man who kindled it to escape before the powder became ignited. A multitude of spectators had collected on the surrounding hills to witness the result of the experiment which had cost so much time and money to perfect, and in which many were deeply interested; for it was not known how far the lower lake would remain uninjured by the afflux of water from the upper one. Ten minutes elapsed beyond the time calculated by the engineer, and yet no explosion took place; some began to fear that the attempt had failed, when at length a dull smothered sound was heard, and immediately after a black torrent of mud and water was seen to issue from the lower extremity of the tunnel. The experiment succeeded, the connexion between the tunnel and the upper lake was fully made; and the water continued to flow through the tunnel for sixteen days, by which time the level of the water in the upper lake had been reduced to the level of the mouth of the tunnel itself, so that no more could flow through.

Some inconvenience resulted to the inhabitants of the shores of the upper lakes, in a way that seems not to have been anticipated. The steep banks, deprived on a sudden of the support of the water, began to crack; large masses broke off, and a very considerable fissure appeared near Lungern, which threatened injury to it: so that the church and many of the houses were dismantled and abandoned, and the bells removed from the tower. A piece of ground several acres in extent slid into the water, but no serious inconvenience resulted. The portion of land recovered by this draining process presented for some months only a blank surface of mud and sand, to which the crows resorted in great numbers to feed on the worms and shell-fish left dry by the receding waters. By the latter end of the year a crop of potatoes was raised on part; and means were gradually adopted for bringing the whole of it ultimately into profitable cultivation.

Sometimes these hydraulic operations are intended to repair mischief occasioned by some unforeseen disaster, instead of altering an established order of things. There was formerly near the small Lake Thun a river

which ran parallel with it for a considerable distance, but did not flow into it. Owing to the quantity of mud which it brought down with its waters, and the slight inclination of its channel in this part of its course, it converted the surrounding district into an unhealthy marsh, and gave rise to a project which was executed in the early part of the last century, of directing the course of the river into the adjacent lake. This was effected by cutting a canal about two hundred and seventy feet wide from the river to the lake, a distance of rather more than half a mile. By this change, of course, a considerable district of land has been drained and made profitable; while the deposit of sand and stones brought down by the river into the lake has formed a delta which is annually increasing, and which may ultimately form a patch of cultivable land.

Some of the most singular instances of Engineering in the Alps are those which relate to the conveyance of timber from the forests to market or to places where it is to be used. There were details given on this subject in Number 693, and we now present a few more, so far as they may illustrate this species of national industry.

In some of the Eastern Alps there are forests which are so far from any market as to convey an idea that it would be impossible to make them a source of profit; and yet the inhabitants of many districts live wholly by such means; necessity having roused their ingenuity to the devising of adequate plans. They have contrivances called *riesen*, *klausen*, and *rechen*, to aid in this object.

The *riesen* are the slides or troughs, such as the often described slide of Alpnach, in which the trunks of trees are made to descend with great swiftness to a river or lake. The slides are generally formed of fir-trees stripped of their branches and bark, and laid side by side so as to form a hollow channel five or six feet across and three or four in depth. These channels sometimes extend a length of many miles, arranged so as to maintain a gradual descent, sometimes curving round the shoulders of mountains, sometimes carried in tunnels through projecting rocks, and at other times conducted over ravines and depressions on the tops of tall stems, until they terminate on the borders of some stream capable of floating the wood. Many of the forests are traversed by these troughs in various directions. The woodmen fell the trees, trim off the branches, and, when the slides are slippery after rain or snow, launch them down the slides. Although the inclination is not great to the eye, perhaps not more than one in twenty, yet the trunks acquire a fearful velocity by the descent, sometimes as great as a mile a minute.

The wood-cutters set out early in spring, in gangs, and employ the summer and autumn in felling the trees, living meanwhile in temporary huts. The felled trees are sorted into stems suited for ship-building and into wood fit for fuel; the former are merely lopped; the latter are cut into logs, split and dried; and the whole are built up in vast stacks. When the weather has fairly set in and the snow has fallen deep, the wood-cutters arm their shoes with pointed spikes, and convey the logs to the margin of the trough by means of oxen. The snow is partially removed from the trough, and water is poured down, which, by its freezing, serves to diminish the friction and to increase the rapidity of the descents. Sometimes the riese or slide terminates at a precipice overhanging a lake; and the logs then precipitate themselves into the lake with irresistible force: it occasionally happens that the logs are caught and entangled before they reach the bottom of the precipice, and the woodman is lowered by a rope from the brink of the precipice to detach the logs from their entanglement.

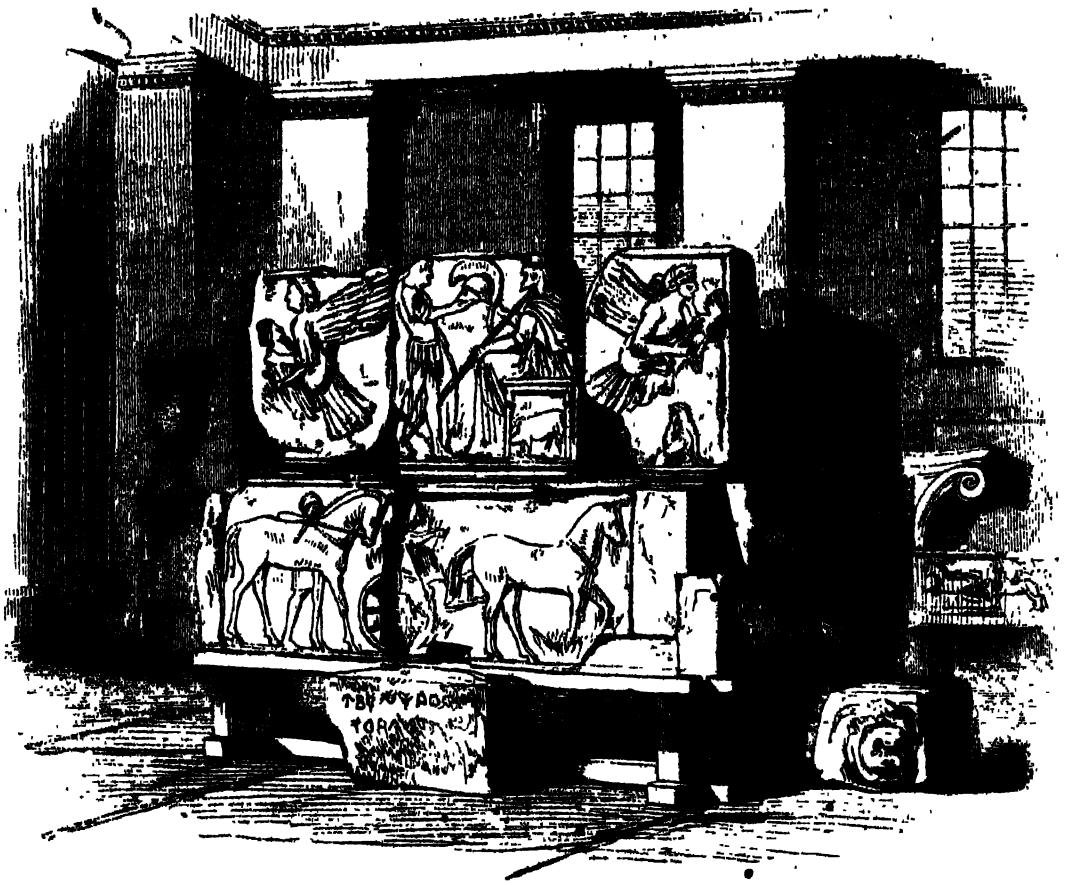
When many logs have thus descended into a lake or river, they would be scattered about in various directions, were it not that dams and barriers of wood called *rechen* are erected at certain spots to stop their progress. They are here collected and sorted according to their quality, by the persons to whom they belong. Different proprietors distinguish the wood belonging to them by the length of the logs, each proprietor adopting a particular length of log, so that the property of each can be distinguished with great readiness.

Some of these trunks of trees are transported to the Black Sea or the Adriatic, for ship-building. The greater part of the wood, however, is consumed for fuel in the country where it grows, for supplying the mines, the salt-pans, or the melting-furnaces. Here again some curious arrangements are necessary. It frequently happens that a ridge of high mountains intervenes between the forests and the places where the fuel is to be consumed, or that the timber grows near streams flowing in a contrary direction to the point where it is wanted. Under such circumstances the transport is effected by means of a vast inclined plane, called a *Holzaufzug*, or wood-lifter, extending from the bottom of the valley to the summit of the nearest cliff. A number of waggons are constructed to run up and down it on a sort of railroad; when loaded they are attached by ropes to a species of windlass communicating with a water-wheel, which is put in motion by turning on it the stream of a mountain torrent. By this means the logs are raised to the top of a ridge many hundred feet high, and are then transported down the opposite side in the usual manner.

Goats' Milk in Spain.—We drank little wine and abundance of goats' milk—that is not only the best in the world, but superior to any other milk I ever tasted; I am not aware of the cause of its superiority, unless it be the plants on which they browse at this season. We consumed large quantities of it, generally commencing and ending the day by emptying capacious bowls, and the people were often surprised at the number of quartillos or pints that were ordered: it is sweet, and so light as to be of quite imperceptible digestion. At Pedroso, owing to the regulations above mentioned, it was obliged to be brought from some distance; the goats being driven down for the purpose of supplying our wants, but of course not allowed to quit the road or browse on the land.—*Captain Widdrington's Spain and Spaniards in* 1843.

Eating with the Fingers.—We have even gone so far as to adopt their manner of eating; and here I must digress to beg you not to say "How very disgusting!" but read *how* we do it, and then you may confess that it is not so unpleasant as you thought. The dishes are prepared in a very delicate manner; for instance, small cucumbers and other vegetables of a similar kind are scooped out and stuffed with minced meat and rice; minced meat is wrapped in vine-leaves, and so dexterously cooked, that each leaf with its contents continues compact, and is easily taken in the fingers. Fried meat in cakes, and the same in form of sausages, are equally convenient; and all I have mentioned, and a hundred others (for there is great variety in their cookery), may be taken almost as delicately as a slice of cake. For soups, rice prepared in the Eastern manner, and stews, we use spoons; and so do the Turks.—*Mrs. Poole's English-woman in Egypt.*

The Chameleon.—We have heard of the chameleon's food being the air; it lives, however, on more substantial diet; but this story may have arisen from the following circumstance:—the lungs are exceedingly voluminous, and these the creature is able to fill with air so as to puff itself up, and in this state it often remains for hours without any movement of respiration being perceptible; on exhausting the lungs of the air, the sides of the body fall in, and the frame has a meagre appearance till the lungs are again inflated, when it becomes suddenly bloated as before. Certain continuations of these lungs penetrate the mucous cellules into which the abdominal cavity is regularly divided, while others penetrate under the skin between the muscles, to which the former adheres only by lax membranes, especially on the spine, down the centre of the under parts, and on the limbs and tail.



[Xanthian Marbles in the British Museum.]

THE XANTHIAN MARBLES.

The Xanthian Marbles, now deposited in the British Museum, have been brought from the ruins of the ancient city of Xanthus, in Lycia. Mr. Fellows discovered the ruins in 1838, when travelling in Asia Minor. He has since been three times to the country, his last expedition having been made under the auspices of the British government; and his last acquisitions have been landed, since his return, in 120 cases. Some of the sculptured marbles obtained by Mr. Fellows have been since 1842 in the Egyptian Saloon of the British Museum, and several others have been recently placed in the adjoining Phigalian Room. The rest remain in the vaults and lumber-rooms of the Museum till a large apartment, where it is intended to arrange them all together, shall be ready to receive them.

Lycia is a country peculiarly interesting, as well from the associations, poetical and historical, connected with it, as from the contrast between its former prosperous condition and its present state of desolation. In ancient times it was crowded with cities, heaps of the ruins of which have been discovered, consisting of columns, pediments, friezes, and other remains of architecture and sculpture, together with vast numbers of tombs, many of which are ornamented with beautiful sculptures. In Pliny's time there were thirty-six cities in Lycia, and there had been twice as many. The ruins of twenty-four cities have been discovered in recent times, thirteen by Mr. Fellows, and eleven previously.

The whole of Lycia, once so populous, so full of cities, and so highly cultivated, is now in the most wild and desolate state. The little port-town of Macry stands among the ruins of the ancient Telmessus, and there are a few houses on the site of Tlos; but with these and two or three other exceptions, only a few huts of peasants are scattered here and there around, but not among the ruins of the ancient cities, and elsewhere over the country. Lions, leopards, bears, wolves, wild boars of enormous size, and large serpents are abundant in the wooded districts. In the neighbourhood of the ruins of Sidyma, for instance, where there are only three or four huts, the country is full of wild animals of the fiercest kind. In some districts, the peasant carries his gun always slung over his shoulder, even within the limits of his own cultivated fields; and the cottages throughout the whole country are protected from the wild animals by powerful and fierce dogs.

The earliest notices which we have of the Lycians are those of Homer and Herodotus. They were a warlike people, especially famed for their skill in throwing the javelin and the use of the bow. The readers of Homer are familiar with the name of Pandarus, who distinguished himself at Troy in the use of both these instruments of war, and with the exploits of Sarpedon and his friend Glaucus, who appear in the 'Iliad' as the allies of the Trojans. The poet informs us that "Sarpedon and blameless Glaucus led the Lycians, far away from Lycia and the gulfy Xanthus." Herodotus mentions that the city of Xanthus, which stood on the bank of the river, was originally peopled from Crete, and the traditional record is, that the colony was settled there under Sarpedon; that Sarpedon was joined by Lycus, an exile from Athens, who afterwards became king of the country; and that from

Lycus the country was called Lycia. Crœsus, king of Lydia, conquered the whole of Asia Minor except Lycia and Cilicia, but was himself defeated by Cyrus, king of Persia, about 550 B.C. Lycia was subdued by Harpagus, Cyrus's general, about the same time. Most of the cities of Lycia yielded to Harpagus with little opposition, but Herodotus (i. 176) gives the following account of the resistance of the Xanthians:—"When Harpagus led his army into the Xanthian plain, the Lycians, though few opposed to many, advanced to meet their enemies, and fought them with determined valour. Being overpowered, and compelled to retreat into the city, they collected together within the Acropolis their women, children, domestics, and valuable effects, and burnt the whole in the Acropolis. At the same time they bound themselves by dreadful oaths never to yield; then, sallying out, they attacked the enemy, and fought till every Xanthian was killed. The present Xanthians are all foreigners except eighty families, who happened to be absent at the time, and thus escaped." After this period Greek colonies seem to have settled all over the country, which, however, continued subject to the Persians till it was conquered by the Seleucidæ, under the government of whom it remained till the overthrow of Antiochus Asiaticus by the Romans in the year 65 B.C. The country was then transferred to the Rhodians, but their freedom was shortly afterwards granted to the Lycians, and they were allowed to preserve their own constitution and laws. Byzantine and Christian masters succeeded, till Lycia fell into the hands of the Turks, under whose despotic domination her cities have become heaps of ruins, and the fruitful land has been converted into a wilderness.

In the mythological history of Lycia are included the fables of Bellerophon and the carrying away of the daughters of Pandarus by the Harpies. Bellerophon, mounted on the winged horse Pegasus, slew the monster Chimæra, which is described by Hesiod as "breathing pernicious fire, terrible, huge, swift-footed, and strong, with three heads, one of a lion, another of a goat, and another of a serpent." In Mr. Fellows's 'Discoveries in Lycia' is represented a figure of the Chimæra from a very ancient terra-cotta: the whole body, as well as the head, is that of a lion, but the head and shoulders of a goat rise from the back of the lion, and his tail is a serpent, with a serpent's head at the end. A sculpture of Bellerophon and the Chimæra is among Mr. Fellows's last acquisitions, but it has not yet been exhibited to the public. Hesiod goes on to inform us that Chimæra brought forth the Sphinx. Bellerophon, Pegasus, and the Sphinx are frequent subjects on the Lycian sculptures and coins. The Græco-Lycian coins have the head and emblems of Apollo, whose worship in later times became general throughout the country.

The story of the daughters of Pandarus is thus told by Penelope in the 20th book of the 'Odyssey':—

> "The gods had taken away their parents, and they were left orphans in the palace; but they were nourished by Aphrodite with curds and sweet honey and delicious wine.
> Hera bestowed on them, above all other women, beauty and prudence; chaste Artemis perfected their stature, and Athena taught them to execute admirable works:
> but whilst Aphrodite was absent at great Olympus, soliciting for the virgins the consummation of the marriage-chamber
> from thunder-enjoying Zeus (who well knows all things, and the good and evil destinies of mortal men),
> then the Harpies ceised and bore away the virgins, and gave them to the odious Fates as a propitiation."

The Lycian language was different from the Greek, and had different alphabetic characters. Numerous inscriptions have been found; many of them have been copied, and others have been brought away. Some of the inscriptions are duplicate, in Lycian and Greek, by means of which considerable progress has already been made in the investigation of this ancient language.

The city of Xanthus was situated on the top and sides of a precipitous hill, on the east bank of the river Xanthus, about five miles from the place where it flows into the Mediterranean. The river has its source in a lofty and snow-capped range of mountains, forming a wall of partition between the north of Lycia and the elevated table-lands of Phrygia, which are not much lower than the summits of this mountain-range. The Xanthus is a wild and powerful stream, and in the lower part of its course has a volume of water greater than the Thames at Richmond, rushing forward at the rate of about five miles an hour. The colour of the water still corresponds with the name, which in Greek signifies "yellow;" and the turbulence of the river near the mouth, where the navigation is not without risk, still proves the propriety of the epithet "gulfy" applied to it by Homer.

The city of Xanthus certainly contains some of the most ancient remains of architecture and sculpture in Asia Minor. Cyclopæan walls of the finest kind, blended with later Greek work, still exist, and well-squared stones are scattered about in all directions. There are several gateways with their paved roads. The temples appear to have been very numerous, and situated as they were along the brow of the cliff, must have combined with the natural advantages of the site to form one of the most beautiful of cities. Columns, pediments, and friezes, in abundance, still remain, some standing, most of them fallen, many built into ancient walls, and heaps tumbled down the cliff, apparently overthrown by an earthquake. The Acropolis, or town on the top of the hill, evidently formed the city of the earliest inhabitants. The inscriptions and sculptures in this upper part of the city are all Lycian, and some of them perhaps as old as six or seven centuries before the Christian era. The additions made to the city by the Greeks are lower down, and in this lower part the inscriptions and sculptures are mostly Greek. The tombs extend over miles of country to the south-east and west of the city, and are numerous on the opposite side of the river.

A great number of the sculptures which have been brought to this country have been taken from the tombs, which are sometimes cut in the rock, as caves, with an ornamented door of stone,—and sometimes formed by cutting away the rock, and leaving the tomb standing as an independent structure, resembling a small Greek temple with a ridge ornamented with sculpture extending along the top of the roof. Two large tombs have been found, each of which consisted of a lofty square pillar; they had a square sarcophagus at the top, the sides of which were ornamented with sculpture, and the top covered by a square stone lid projecting far over. One of these two tombs has been called the Harpy Tomb and the other the Lion Tomb, from the sculptures on them. The square shaft or pillar of the Harpy Tomb was seventeen feet high. Two other large tombs, of a form somewhat different, have been called the Chimæra Tomb and the Winged Chariot Tomb; these two last were lofty square pedestals of three stories, with a vaulted cover, the gable-end, as it may be called, resembling a Gothic arch.

The Xanthian marbles in the Egyptian Saloon of the Museum are arranged on two temporary structures. One of these is a square erection of wood in the centre of the room, the upper part containing the sculptures of the Harpy Tomb, and the lower part portions of unconnected sculptures. The other structure is a low square enclosure of wood to the right on entering the room, on three exterior sides of which are arranged three sets of small sculptures about a foot high.

There is little doubt that the sculptures of the Harpy

Tomb are representations of the story of the daughters of Pandarus, though parts of them have not yet been explained; as for instance the two male figures between the two harpies who are flying outwards with their prey, as represented in our engraving. A warrior, standing, is receiving a helmet from an aged man with a pointed beard, who is seated on a chair, beneath which is that very undignified animal a pig. On the compartment opposite to this first one, where there are two similar harpies flying away with two females, Aphrodite (Venus), distinguished by the dove which she holds by the wings, is apparently making her solicitation to Zeus (Jove), according to the story in the 'Odyssey.' On a third compartment are two females, seated, one of whom seems to be Hera (Juno), from the peculiar form of her chair, and from the cow and calf near her, emblematic of the fable of Io; and the other has been conjectured to be Aphrodite, the three females standing before her being supposed to be her three attendants the Graces, who in early sculpture are represented as draped. The hair of Aphrodite is very elaborately dressed, as well as that of Hera, while that of the three standing figures hangs down the back in long plaits similar to the manner in which it is still frequently worn in Egypt. A fourth compartment contains an aged man, seated, and a small female figure offering a cock to him. The other figure in this compartment has been supposed to be Artemis (Diana), from what appears to be a hound near her, but which cannot be distinctly made out. Athena (Minerva) has not been recognised among the figures. The harpies are represented with the face, the carefully arranged hair, the full bosom, and the arms of a female, but with large wings, and the body terminating in the talons and tail of a bird of prey. The females with whom the harpies are flying away appear, from their comparative smallness, like children rather than the full-grown and accomplished daughters of King Pandarus; but it will be observed that their hair is too long for children. Probably the artist meant to represent the celestial beings and the harpies as much larger than mortals, and this, as we have observed in other instances, produces the effect of making the larger figures appear of the ordinary size and the smaller look like children. The sculptures of the Harpy Tomb are evidently extremely ancient. The attitudes are stiff, the drapery formal, and the work altogether indicative of a very early state of sculptural art.

Of the small sculptures in the Egyptian Saloon arranged on three sides of the square wooden enclosure, the one which faces the sculptures of the Harpy Tomb represents a bear-hunt and a boar-hunt. Most of the figures are on horseback, galloping, with their mantles flying in the wind. This small work is full of animation; the attitudes and action of the horses are varied and spirited, the positions of the riders natural, and the whole of the figures are well-formed and finished. It is much worn, but still very beautiful. The sculptures on the two other sides of this enclosure are apparently of earlier and inferior work. One represents a peaceful scene, which is in some respects very rudely designed and executed; the other, a battle, very spirited, and of better work than the last.

The Xanthian sculptures which have been recently placed in the Phigalian Room are of various sizes. One set of slabs, about three feet high, represents a battle, in which some of the combatants are on horseback and some on foot, some in Persian costume and some in Grecian. Another frieze, about two feet high, represents the siege of a walled town. In one part, the inhabitants, chiefly within the walls, but some making a sortie, are repelling the invaders with stones. In another part, soldiers are mounting the walls by a ladder, under cover of their shields. The story is told with dramatic distinctness, and the combatants are represented with great force and animation. Both these friezes are defective in the details and execution, but admirable in invention and expression. In this room there are also some smaller sculptures about a foot high; one series, of excellent workmanship, exhibits a sacrifice: there are the altar, the priest, the sacrificer, the oxen to be sacrificed, and a variety of persons bringing lambs, kids, and other animals, in their hands, slung to a stick over the shoulder, and in other ways, together with other figures bringing baskets of fruit. Another small sculpture represents a feast, with the figures recumbent in the manner customary among the Greeks and Romans.

All these sculptures are, we believe, from the ruins of the city of Xanthus, but it is stated that a few others have been brought as specimens from the ruins of some of the other cities of Lycia.

THE PREPARED PEAT-FUEL OF IRELAND.

That bog-earth, or turf, or peat (for these names are applied with very little discrimination to the same substance) is used extensively in Ireland as fuel, is pretty well known: but the mode in which the preparation of the peat for sale is carried on, and the distinct occupations which arise out of it, are not quite so well known in this country. In our No. 610 an illustrated sketch was given of a peat-gatherer, a poor woman who supplied her own hut with winter fuel from a peat-moss which happened to be near. But in a more extensive scale there is something like division of labour: and the peat-dealers estimate at money-value their relative services in bringing it to market.

The peat is furnished by those large patches of uncultivated ground called the Irish bogs; many of which have distinctive names, while others are unnamed. The Bog of Allen, one of the most considerable, extends pretty nearly all the way from Dublin to the Shannon. It is a flat district whose surface-soil is formed of that decayed vegetable matter which constitutes peat. The two principal towns of King's County, Philipstown and Tullamore, are situated on this bog; and their position is so dreary, monotonous, and uninviting, as to have given rise to the following uncomplimentary address:—

> "Great Bog of Allen, swallow down
> That odious heap called Philipstown;
> And, if thy maw can swallow more,
> Pray take—and welcome—Tullamore."

A canal runs through this bog, and on its banks may be seen stacks of peat, and the huts or hovels of the peat-gatherers. These men rent from two to five acres of peat-land each, and subsist by cutting the peat and bringing it to market. The bog of Allen once contained a million acres of peat-land; but by the cutting of two canals through it, by a process of artificial draining, and by the clearance effected by the peat-gatherers, the quantity has been reduced to less than one-third of this amount. Much good arable land has been thus obtained; and the process of reclamation is still going on.

There are thus two objects in view with respect to the cutting of peat in Ireland: the supply of fuel as a substitute for coal; and the preparation of land for agricultural purposes. The arrangements for the first object are stated by Mr. Hall to be nearly as follow:—

The turf fuel is brought to a fit state by the six distinct processes of *cutting*, *spreading*, *footing*, *rickling*, *clamping*, and *drawing home*. The first operation, or cutting, requires four men, provided with two turf-barrows. The chief or strongest man is selected to use the slane or turf-spade. This slane is narrower than a common spade, and has a ledge at right angles

to one side. The man next in strength manages the turf-barrows, of which one is being filled while the other is being wheeled away for emptying; so that as fast as the cutter slices up the turf from the surface of the ground, and fills the barrow, the second man conveys away the before. The third man goes before the turf-cutter, levelling and preparing the ground; while the fourth man lifts the pieces of turf, two at a time, as they are sliced off by the cutter, and places them in the barrow. The men thus employed are paid at the rate of about a shilling a day each, by those who make peat-gathering a regular occupation. The quantity cut and wheeled out by these four in one day is generally termed a *dark*; but it is not a definite quantity, for its amount depends a good deal on the strength and skill of the men. Still, when a cottager speaks of his turf fuel, he estimates it at so many darks; and a year's supply for a cottage with one fire varies from two to four darks. An average dark contains about sixty cubic yards of peat; being about sixty yards long, one yard in width, and in three tiers of thickness about a foot each. It is cut into small pieces, which, when wheeled away, are emptied out into the "spread-field," where it is left untouched for a few days.

A number of women and children then "spread" or scatter the turf from the small barrow-heaps, so as to cover the whole surface of the spread-field. One woman can spread about three darks in a day; and the turf is allowed to remain in this state another week. At the end of this interval the process of "footing" is commenced. This consists in collecting the turf into parcels of about six each, placing them on end in a circle, and supporting them against each other by making them meet in a point at the top. This is done by women and children, one of whom can "foot" a dark in a day. After remaining in these little heaps about ten days, the turf goes through the process of "rickling." This consists in piling the turfs one on another on their sides, into a group called a rickle; this is also the work of women and children, two of whom can rickle three darks in a day. After remaining in this state about a fortnight, the turf is exposed to the next or fifth process, that of "clamping." The clamps are small stacks about twelve feet long, six feet high, and four feet wide; and the process of clamping consists in forming these stacks from the rickles. These are placed on the most convenient spots for the carts to approach. A man can clamp a dark and a half in a day, or sometimes the turf is carted home from the rickles, without being clamped at all.

Lastly comes the "drawing home." The carts usually go to the field in fine dry weather, and bring away the turf; but sometimes, through indolence or inattention, this is deferred until the fine weather is past and the bogs have become inaccessible to carts; and the men are in such case obliged to carry the turf home in ricks on their backs through the winter, thereby enormously increasing the cost of transport.

When the turf has been "drawn home," it is usually built in a large stack exposed to the weather, either thatched over or covered with a shed, if the owner be prudent. One end of the stack is presented towards the prevailing wind at the spot; and is built up in "leets" or detached portions, in such a manner that a fortnight's or a month's supply can be obtained from the sheltered end of the stack at one time, leaving always a square face to the stack. The outside or weather turf is made slightly inclined, and the whole stack so built up as to be preserved as much as possible from the wet throughout the winter, while at the same time it is exposed to the action of the air; the winter's consumption greatly depends on the careful management of the stack.

In order to obtain a timely supply of turf, it is deemed well to commence the cutting in March, because all the processes noticed above can only be effected in the times mentioned if the weather be fine; but there is so much rain in Ireland, that the drying of the turf is in practice very much slower, and if not commenced early in the year, cannot be properly completed before winter. When conducted on this tolerably complete system, the supply of turf costs about as follows: Four men one day each, in cutting a dark of turf, 4*s.*; one woman spreading a dark, 2*d.*; one woman footing, 6*d.*; one woman rickling, 4*d.*; one man clamping 1*s.* 3*d.*: making about 6*s.* 3*d.* in the whole. The cost of bringing home depends on the distance, being as low as five shillings for half a mile, and as much as forty shillings for four miles. It will thus be seen that the turf becomes rather an expensive kind of fuel if it has to be carried to any great distance from where it is cut.

When the surface peat has been removed from a bog by these means, there is a softer and inferior kind beneath, which is afterwards brought to a fit state for fuel by other means. It is less fibrous than the surface turf, containing earth and dissolved vegetable matter, and so deficient in cohesiveness that it would crumble if worked by the spade. The mode of procuring and working it, therefore, is as follows:—After a sufficient quantity has been raised from the bog and carried to the dry margin, it is worked by the naked feet of men and women, who knead it into a kind of dough. It is then moulded into shape, like loaves for the oven, by the hands of other men and women, and spread out on the ground. When these have drained a little, several of them are placed together, and re-footed or kneaded; and by this means it is brought at length to such a state of solidity as to be formed into square pieces, "clamped" up into heaps to dry. These turfs are carried to market in a large basket of wicker-work, called a "kish:" they are black, give out much ashes, and are inferior to those procured by the shave.

Where the system of turf-cutting is thus conducted by many persons working together, the bog is not regarded as a common land in which every person may help himself; it is let out on certain terms, in small patches, to persons who get a profit for their labour beyond the rental. Every renter used to cut out where he pleased, and in consequence the surface in some parts became full of holes, which, when filled with rain-water, were sources of much inconvenience. The proprietors are, however, now acting on a better plan; they usually have a steward to mark out each person's portion or "bank;" and these stewards take care to have the peat cut continuously and uniformly.

Scotland has its peat-mosses, as well as Ireland its bogs, both being of analogous origin, and both applicable as fuel. The Scotch however have brought inventive ingenuity to bear on the subject, in a manner apparently almost unknown yet in Ireland. If the moisture could be expelled from the peat in a shorter time, it could be more promptly brought to market, and this is done in Scotland by using a compressing-machine, in lieu of the bare feet and the field drying of the Irish system. In the Transactions of the Highland Society, some years ago, a paper was published from Mr. Slight, in which he makes the following remarks in reference to Scotland, which, with a few modifications, would be applicable to Ireland also:—"The introduction of a simple and efficient machine would appear to be of great benefit to the inhabitants of the peat districts, and should the plan be objected to as expensive beyond the means of the poorer class, it may be answered that there is no necessity for each family or householder to possess one. Let the proprietor or tacksman furnish one or more for the use of his tenants or cottars, who might again pay a small equivalent for the use of the machine. As the cottars of one farm in one

hamlet usually dig their peats in the same field, a sufficient number could join together to work it to advantage." Mr. Tod constructed a machine having this object in view. It was considered that such a machine ought to be so simple that the rudest mechanic could make it and keep it in repair, so portable as to be easily moved about from one part of a field to another, and to be cheap in construction and expeditious in action. Mr. Tod's machine consisted of a stage on which an oblong box could be placed, and a lever which pressed down on this box with great power. The box was filled with moist peat, and a solid block or cover was pressed down upon it with a force so sudden and great as to squeeze out the water, and leave the peat as an oblong solid mass. Provided with two of these boxes, the process went on with great rapidity; one man digging out the peat, another lifting it and bringing it to the machine; two were emptying, filling, and placing the boxes, and one man working the lever of the compressing-machine. The peats when taken from the machine were built up like small stacks of bricks, but so open as to admit a free circulation of air; and the stacks put up in this way became perfectly dry before being moved.

More recently Lord Willoughby has invented several peat-compressing machines, for the benefit of the poorer districts of Scotland. Many of these are very ingenious and effective; but in the primitive state of things presented in Ireland it would seem that a more simple, cheap, and rude machine would in the first instance be more immediately serviceable.

When it is stated that beds of coal exist in Ireland, it might seem strange that this less perfect kind of fuel should be so much used, while in England coal is almost everywhere the customary fuel. But it is a question mainly of comparative expense. Although there are coal-beds in Ireland, yet the coal is generally not of good quality; and even within a few miles of some of the pits English coal is said to be actually cheaper than the Irish, arising from the imperfect and unprofitable way in which the Irish pits are often managed and the great expense of land-carriage. These sources of inferiority may be surmounted; but if the coal continues to be of worse quality than that of England, it will probably be kept almost in disuse by the use of English coals in the better houses and of turf in the humbler.

With reference to the use of turf in Ireland, Mr. Hall remarks:—"Some have objected to the cutting of turf as being wasteful to the surface; others object to the cultivation of bogs as diminishing the supply of fuel. All such objections appear to be alike frivolous. The surface is unquestionably improved for cultivation by cutting away the surplus bog, as it may be wanted for fuel, provided it be not stripped quite bare, but that a sufficient quantity be left to make a good mixture with the subsoil; and, on the other hand, the supply of peat-fuel left for future generations does not receive any additional security by retaining the vast tracts, from which that fuel is hereafter to be cut, unproductive in the mean time. The peat would be as safe and much more easy of access, if it was properly drained, intersected with roads, and made to bear copious crops on its surface, than it is at present, saturated with water and covered with heather."

A Spanish Town.—Logroman is an ill-built and dirty place: the streets are narrow and inconvenient, the masses of stone on which it stands protruding, and making the passage through narrow and ill-kept streets excessively incommodious; and when they are flooded by the descent of the water from the higher grounds some of them are nearly impassable. The population is about 4000; and it is a perfect specimen of that class of towns called labradores, or farmers and agricultural labourers. There are a few houses with escutcheons over the doors, to which are attached small mayorasgos, or independent properties; but they are little distinguished from those of their neighbours, and there appears to be nearly the sort of equality among them so often found in such places in Spain. There are no shops, and scarcely any commerce, the whole business of the people being with the cultivation of the land. There are three large estates belonging to the town, in which every inhabitant has a share; two of which are in cultivation, and the other in monte or woodland, to supply fuel and pasture. The custom is once a year to divide or portion out the arable land, and lots are then drawn for each parcel; a single one being allotted to each man who has not a yoke of oxen, a double one to those provided with it. These lands, in fact, form the basis of their existence and afford a fair sample of one of the most curious and little noticed parts of Spanish economy. It is perfectly evident that in this system the lands must be badly cultivated: as they are of necessity changed every year, no one has a further interest than to make all he can during his occupation, and to do as little as possible in the way of improvement. I suggested whether the allowing each man to retain his portion would not be a better plan than this annual change, by which the good cultivator is made to suffer by the mismanagement or selfishness of his predecessor. This they instantly admitted would be the better system; but it cannot be adopted without some legislative enactment, and then there would be great practical difficulty in carrying it into effect. The abuses in the management of these town-lands are among the oldest, most inveterate, most extended, and most incurable in the whole economy in Spain. An immense portion of land, of the extent of which I know not that any account exists, is held by this sort of tenure. It is one cause both of the poverty and of the independence and dignity so striking in the demeanour of the Spanish peasant. By his share in the common lands he is a proprietor, and nearly above absolute want, being in the situation of a small freeholder. By being on an equality with his neighbours at the distribution and other arrangements, which are made in full assembly by the Alcaldes and other authorities of the place, and with the right of checking and controlling or opposing any plan which is a departure from ancient usage, or which does not meet with his approbation, he has many of the advantages of freedom, prescriptively and quite abstracted from any political or constitutional right. This system is drawn from the most remote antiquity, and there is little doubt chiefly from the Visigothic customs, whence many of the traditional liberties of Spain are derived.—*Captain Widdrington's Spain and Spaniards in 1843.*

Hot Winds of New South Wales.—I found the climate of Bathurst still less pleasant than that of Sydney, as in the latter place, however oppressive be the heat, the mid-day sea-breeze moderates it in some degree; but the plains of Bathurst, although considerably elevated, being shut in on all sides by lofty ranges of mountains, must endure without any relief their own oven-like atmosphere, the temperature of which is frequently increased tenfold by a "hot wind," when it seems as if a fiery blast from a huge furnace pervaded all space around, rushing into the house through every opening with the force of a hurricane. My English habit of flinging wide open all doors and windows in warm weather, I here found (as a matter of course, so near the Antipodes) a most imprudent course to pursue; as the only chance of preserving a moderately-endurable existence during the continuance of the sirocco is, immediately on its approach to shut every door and window, and with closely-drawn blinds to await, as patiently and movelessly as half-suffocated mortals may be expected to do, the abatement of the terrible visitation. With us, however, a few hours of faintness, thirst, and misery generally comprise the whole evil (though sometimes the hot winds blow almost without intermission for several days); but the luckless fields and gardens escape not so easily. Every green thing looks as if a salamander had been held over it, either drooping and dying, or dried up like half-burnt paper. I have seen large tracts of cultivated land, covered with luxuriant green crops of wheat, barley, or oats, just going into ear, scorched, shrivelled, absolutely blackened by the heat, and fit for nothing but to cut as bad litter. Less important, though extremely vexatious, is the destruction caused in gardens, where the most delicate and beautiful flowers are ever the first to wither under the burning breath of this fervid air-king.—*Mrs. Meredith's Notes and Sketches of New South Wales.*

A DAY AT AN ELECTRO-PLATE FACTORY.



[Silver-Deposit Room: Messrs. Elkington's, Birmingham.]

THERE are from time to time novelties introduced into manufactures, so startling, that it is difficult at first to regard them in the sober light of industrial processes; since they seem to belong rather to the marvellous than to the real. Who would have thought, for instance, of a silver vase or candelabrum, or any other article of table-plate, being made through the agency of electricity? It seems but a short time ago when all the phraseology relating to galvanic batteries, conducting fluids, positive and negative poles, chemical decomposition, &c. belonged exclusively to the lecture-room and scientific treatises; but now such terms form part and parcel of manufacturing processes, and electricity has become one of the working tools of productive industry.

Those who have paid a little attention to the recent progress of manufactures will perceive that we are alluding to the new art of *Electro-metallurgy*, or *Electro gilding* and *silvering*; but it is by no means generally known wherein the principle of this new art consists. To give such brief details as will convey this general knowledge is the object of the present paper; and, if we mistake not, the example which this process affords of the application of a scientific principle to practical purposes will be regarded as equally beautiful and interesting.

Without diving into the abstrusities of electrical science, it will be well to show how the idea arose of applying this agency to manufactures in metal. A galvanic battery is a vessel, consisting of several cells or compartments containing a liquid, generally of an acid character, and into this liquid are immersed sheets of metal, generally copper and zinc. The precise arrangement adopted has undergone gradual changes, and is made dependent on the purpose in view, but the principle involved is very simple, and may be thus expressed:—Water consists of oxygen and hydrogen, and if a metal (such as zinc) which has a great affinity for oxygen is immersed in the water, there is a tendency to decomposition, the oxygen combining with the zinc to form oxide of zinc, and the hydrogen being liberated. But in order that this tendency may develop itself, it is necessary to place in the same liquid a piece of some other metal (such as copper) which has a less affinity for oxygen than zinc has, and to connect the copper with the zinc by a piece of wire. Other arrangements are necessary for getting rid of the oxide of zinc as fast as it is formed; but the point of importance is, that so long as the decomposition of the water and the oxidation of the zinc are going on, there is a current of electricity passing silently and invisibly through the whole arrangement in a continuous circuit.

Now it happened that in a particular form of battery devised by Professor Daniell, a solution of sulphate of copper was one of the liquids through which this electrical current passed in its progress; and the effect of the current was to decompose the sulphate, separate the copper from the sulphuric acid with which it was combined, and deposit it in a very fine metallic state upon the inner surface of the vessel which contained the liquid. It was afterwards observed, that on remov-

ing such a film of copper from the vessel, it presents an exact countertype of the surface of the vessel, every minute line or spot being faithfully copied. This was at the time regarded merely as a curious scientific fact; but it afterwards occurred to Mr. Spencer of Liverpool, Mr. Jordan of London, and Professor Jacobi of St. Petersburg (independently of one another), that copies of medals and of engravings might be made by these means; and thus arose an art which obtained the names of galvano-plastics, electrotype, and voltatype. The simultaneous progress of three persons towards the same result, in mutual ignorance of each other's proceedings, is something remarkable. Professor Jacobi's investigations became known in England about April, 1839; but Mr. Jordan, in the 'Mechanic's Magazine' for May of the same year, and Mr. Spencer, in the 'Athenæum' and other journals, a few months afterwards, showed that they had each been prosecuting such experiments before Jacobi's labours were made known.

By these steps, then, the broad fact became established that if a galvanic current passes through a liquid containing sulphate of copper, the copper will become precipitated on any surface fitted for its reception, and will present an exact counterpart of that surface. But the fact was not likely to remain long in that state: questions would arise whether other metallic solutions besides sulphate of copper could be employed, whether other metals than copper could be deposited, and whether other applications of the principle could be made besides simply copying engravings and medals. It was to these points especially that a patent taken out by Messrs. Elkington, about four years ago, was directed; and the result has been the establishment of a branch of manufacture as surprising perhaps as any thing exhibited at the present day. Not only copper, but silver and gold, as well as the cheaper metals, can now be precipitated in a metallic form from their solutions; and not only can a superficial film of these metals be deposited, but a solid article of pure gold, silver, or copper can actually be made by such means!

It would be taking us into too wide a field to trace the steps, and mention the persons, whereby various advances have been made in the theory or the practice of electro-working; but it will suffice, in conformity with the object of our "factory visits," to describe the present state of the art, as witnessed at a fine establishment belonging to Messrs Elkington, at Birmingham, to which we have been obligingly favoured with access.

This factory, situated in the northern part of Birmingham, comprises a large pile of buildings enclosing a square central court. On making the tour of the various ranges of rooms, it becomes presently evident that there is something more going on than the mere management of batteries and solutions; there is modelling and casting, stamping and punching, chasing and engraving, and a number of mechanical arts which have nothing either chemical or electrical in their general character. In point of fact there are almost as many mechanical processes carried on as if articles of plate were manufactured by the old method; for, although galvanic action deposits the costly metal in the required form, yet there must be a model or foundation presenting this form; and to prepare this foundation requires the aid of a whole range of ingenious mechanical processes. The nature of these operations and the arrangements of the different departments, may best be noticed as we go on.

Perhaps we may more clearly show the nature of the new process by comparing it with the old; and therefore we will endeavour to throw a hasty glance over most of the modes of producing articles which present a gold or silver exterior.

In all articles made of wood, plaster, or similar materials, the golden surface is produced by laying on thin sheets or leaves of gold, which are made to adhere by means of a glutinous gold size, and which are afterwards brought to a finished appearance by processes which are purely mechanical, and involve no chemical niceties. When, however, metals are to be coated with gold (or silver), a different range of processes is necessary, and many different means have been adopted. At one time polished iron, steel, and copper were gilt in France by the following means:—the metal was heated to a certain temperature, and on it was laid a leaf of gold of a particular thickness; this was burnished down, then heated, then another applied, then burnished and heated, and so on till several thicknesses were applied, after which it was burnished cold. 'Water-gilding' or 'wash-gilding' is a mode of applying a surface of gold to metallic articles by coating the article with a thin layer of gold amalgam (mercury and gold), dissipating the mercury by heat, and burnishing and otherwise finishing the golden surface which remains.

A mode of gilding was patented by Messrs. Elkington in 1836, which consists in the use of a solution of gold, in which the articles are immersed. The copper or other metallic articles to be gilt are, after being well cleansed, immersed in a boiling-hot liquid consisting of a solution of nitro-muriate of gold mixed with a solution of bi-carbonate of potash. This adhesion of the gold to the inferior metal takes place by a singular interchange, for a portion of the copper becomes dissolved by the action of the potash, and an equivalent of gold is deposited upon the copper article instead. We believe that this mode of gilding is now rather extensively adopted in France.

By slight modifications of the processes, silver may be applied in the same way as gold, as a superficial coating to other metals; and at various times, and in various countries, both the one and the other metal have been applied in the various states of amalgam, of leaf, of solution, of paste, and of powder.

A wholly distinct kind of work is that which is termed *plating*, in which a plate of silver is united to a plate of copper by mechanical means, the former being greatly thinner than the latter, and being intended for the outer surface of the article to be made. The French mode of silvering by laying leaves of silver on heated metal was so defective as to lead to the method of plating, which is, we believe, an English invention. An ingot of a mixed metal (copper and brass) is first made about twenty inches long, three broad, and one and a half thick. One surface of this ingot (or both if it is to be double plated) is cleaned, and on it is laid a sheet of silver about one-fortieth the thickness of the ingot; the two are tied together with wire, touched at the edges with a little borax to act as a flux, and exposed to the heat of a furnace by which the two metals are soldered firmly together. This compound ingot is afterwards laminated in a rolling-mill to the form of thin sheets; and the sheets so formed are brought into ornamental forms by stamping, punching, hammering, and other mechanical processes, the copper foundation forming the substance of the article, and the silver side forming the exterior surface.

A great improvement on this manufacture was made at Sheffield some years ago by the introduction of what were called 'solid silver edges.' The ornamental edges of candlesticks and other articles, when merely stamped from thin plated metal, had the double disadvantage of being weak, and of having the silver surface soon rubbed away, leaving an unsightly copper surface exposed. The improvement consists in the following arrangement:—A sheet of silver is rolled to a state of great thinness; not so thin as leaf silver, but still

to a very attenuated state. This silver is stamped into form by means of dies, swages, and other apparatus; and the hollow cavity behind is then filled up with a soft whitish solder of lead and tin. These edges or ornaments are then soldered on any article of plated ware; and are at the same time stronger than the hollow edges before used, and less unsightly when the silver is partially worn off, presenting a whitish ground instead of one of copper. We shall shortly have to speak of a further improvement in the manufacture of these edges.

All the articles of manufacture yet alluded to are those which have only a superficial coating of gold or silver on a foundation of some cheaper metal. The real gold and silver plate, formed wholly of the noble metals, is, however, manufactured by mechanical means very similar to those employed in the plated manufacture. The articles are either cast in molten metal, or they are hammered and stamped from sheets, brought afterwards to a highly finished state by chasing, engraving, and burnishing.

These, then, are some of the principal modes in which gold and silver articles (or those presenting a gold or silver surface) were made before the introduction of the electric process, and still are made where this process is not employed. By following, now, the electro-metallurgic processes in their successive order, we shall see how far they are combined with any of the older processes, and how far they are wholly distinct from them.

The first department of the factory at Birmingham which we may notice is the artistic, where the taste of the artist devises those beautiful forms which are afterwards to be wrought in metal. Whether an article of plate to be manufactured be a candelabrum, a vase, a dish, or anything else, a considerable share of its beauty depends on its elegance of form and gracefulness of ornament; and the production of new designs becomes consequently a point of much importance. It has been pretty generally admitted, that in past times our neighbours the French have in most cases excelled us in the arts of ornamental design: but a rapid progress has been made in England of late years; and there is now a School of Design at Birmingham, partly supported by the government, whose object is to improve the taste of workmen in all that relates to forms, patterns, devices, and ornaments.

Next to the designer comes the modeller, who is also an artist in the proper meaning of the term; for he has to give in bold relief that which the designer presents merely on a flat piece of paper; and he ought to possess an extensive knowledge of the forms of objects, whether animals, plants, or lifeless things, in order to give truth and character to his models. The models to which we here allude are made of a flesh-coloured kind of wax, sufficiently firm to maintain its form uninjured, and at the same time very easily modelled and cut. The tools employed are principally pieces of bone, horn, or hard wood, brought at one or both ends to the forms of points, angles, curves, and edges of various kinds. With these small implements the modeller cuts and trims and works his lump of shapeless wax, till he brings it to the ornamental form which he may require.

When, by these preliminary operations, an exact copy or model in wax of the article has been prepared, the model is handed over to the workers in metal, by whom the pattern is transformed to a wholly different material. Here commences a new subdivision of labour, according to the mode in which the form of the metallic article is to be produced. Sometimes the form is given by casting, or pouring melted metal into moulds presenting a counterstype to the article itself; sometimes by stamping, or imparting to sheets of metal an ornamental form by dies and stamps presenting this countertype: while in other cases the contour is given by brazing, or working up sheets of metal into various curved forms by means of the hammer. The decision as to which of these is employed in any particular case depends on a number of different circumstances, such as the thickness of the metal required, the general shape which it is to assume, and the amount of ornamental device on its surface. It not unfrequently happens that all three sets of processes are employed on one article, each to some one particular part; and indeed many of the excellencies of modern manufacture depend on this union of different modes of operation. We must describe these processes in succession, before an adequate idea can be formed of the complexity of the arrangements in the factory under notice.

The metal here spoken of, as the foundation for gilt and silver articles, is an alloy which has been chosen for many useful properties possessed by it. It is a mixture of copper, nickel, and zinc; hard in substance, infusible except at a high temperature, and white in colour. In past times, when a silver exterior covered a foundation of copper, the abrasion or wear of the silver laid bare the copper, and an unsightly appearance was the consequence; but it has been one of the objects in the modern improvement of the art to select some metal which, while possessing all other requisite qualities, should make a close approximation to silver in colour and appearance. The same proportion of ingredients is adopted; but in the case of castings, fragments and pieces of metal are thrown into the casting-pot to be melted; while in respect to stamped work, the ingots of mixed metal are sent to a rolling-mill, to be rolled to the form of sheets, varying in thickness according to the object in view.

There are many interchanges of form between the wax model and the white metal manufactured article. In the first place, from the wax model is made a mould in lead, by enclosing the model in a sort of frame or border (somewhat in the same way as for plaster of Paris castings), and pouring molten lead on it: this lead, when cold and removed from the model, constitutes an exact mould of the article, and the wax model has then performed its prescribed part in the routine of operations. From this lead mould a cast is taken in molten brass, by similar means; and it is easy to see that the brass cast is an exact copy of the original wax model. This cast is called technically the 'pattern,' and it is carefully examined to see that all the details of ornament are properly developed. Two or more pieces, separately cast up to this state, are often joined by a solder of copper and zinc; and a chaser goes over the whole pattern, to touch up the more delicate details with small cutting tools. When this pattern is once finished, the wax model and the lead mould are no longer wanted, the pattern becoming the source whence thousands of copies may be produced. As these brass patterns are both durable and rather costly, they are preserved so long as there is any probability of copies from them being required; and it thus results that a constantly accumulating stock of them is at hand. In the pattern-rooms of the factory the number and variety of these are altogether countless by a mere visitor; but they are, as may be expected, all orderly arranged and classed, so that the apparent chaos is no chaos to those immediately concerned.

We next transfer our attention to a room where workmen are engaged at troughs and trays containing sand. Here is another intermediate stage of operation. The brass pattern was itself made from a mould of lead; but it must also be the means of making a sand mould before the final white-metal article can be produced. Although the sand seems to be rather a rough

and common material, yet this operation is a very delicate one, and requires much tact and experience. The sand is of a peculiar kind, selected for the purpose, and is sifted and worked to a fine and smooth condition. When a sufficient body of sand is ready, the brass pattern is used to produce an indentation in the sand, so exactly effected that the cavity of the sand shall present in reverse every little detail of form and ornament on the exterior of the pattern; while a central core or plugging is at the same time applied so as to enable the metallic article to be made hollow, for the sake of lightness. It may well be imagined that the choice and preparation of the sand, to ensure a clear and smooth reverse of the brass pattern, must involve great nicety and care.

At length we come to the last stage in this singular train of transformations. The white metal, being brought to a melted state in pots or crucibles made of Stourbridge clay, is poured into these sand-moulds; and on being cooled and removed, the impression thus obtained is a copy of the wax model and the brass pattern, and then constitutes the body or foundation on which the deposit of gold or silver is afterwards to take place. The lead and the sand acted as moulds, but the wax, the brass, and the white metal were three different phases of the original design itself.

Here then we will leave for a time the white-metal cast, and proceed to visit a wholly distinct range of buildings in which the stamped work is under process of manufacture. If we regard the cast-work to be, from its nature, somewhat chemical, we shall find the stamp-work to be solely mechanical.

The ingots of white metal, measuring probably about a foot in length, by six inches in width, and an inch thick, are rolled into sheets, of which ten or twelve different thicknesses are required for different articles of manufacture. For some purposes, such as the pillars of candlesticks, the metal is required to assume the form of tubes; but for stamp-work the metal is always brought to the form of sheets. The stamping consists in imparting to a piece of flat metal, by repeated blows between two dies or stamps, the exact device which those two stamps present, forcing the metal into cavities, and raising it up at the convex parts of the pattern.

The preparation of these two stamps is evidently an operation preliminary to the stamping itself, bearing to it some such relation as the modelling does to the casting in the processes just described. A model in wax is prepared, representing the device to be produced, and this is transferred to the hands of the 'die-sinkers.' These persons take a block of steel or of iron, and by means of hammers and small hard steel tools cut a mould or die corresponding to the model, but of course reversed, having cavities instead of protuberances, and vice versâ. Two pieces are prepared for each pattern: one, the *die*—formed of steel for fine work, and of cast iron for coarse work—being intended to give the exterior surface of the stamped article; and the other, the *force*—formed of lead, of copper, or iron, according to circumstances—giving the hinder or hidden surface. The operation of die-sinking is slow and careful work, requiring considerable skill; and the dies thus prepared, when accumulated in considerable numbers, form a costly part of the working apparatus of the factory.

We have now to see how these dies are employed. In one of the lower departments of the factory are a number of large stamping-machines, by the aid of which the sheet of white metal is forcibly compressed between the die and the force of each pattern. A *pressure*, simply as such, will not produce the desired result; a *blow* is needed, and the arrangement of the machine is in conformity with this requirement. Each of the stamping-machines consists of a strong iron frame, having an iron mallet or hammer working vertically. This hammer is worked by a rope passing over a wheel above, and descending so as to be pulled by a workman. The 'force' is fixed, face downwards, to the lower surface of the descending hammer; while the die, face uppermost, is placed on a fixed solid block which receives the blows of the hammer. The sheet of metal, when cut to the required outline, is placed on the die; and the workman, by forcibly pulling the rope, raises the hammer to a considerable height; and letting it suddenly fall, the hammer descends with great power on the metal sheet, forcing it to assume the convexities and concavities which the two pressing surfaces present.

But the stamping involves more complications than are here mentioned. One blow will go but little way in forcing the metal into the desired form. Ten, twenty, or forty blows are often required; and to prevent the metal from being cracked or injured by these repeated percussions, it requires frequent annealing between the blows, to remove a temporary rigidity of surface which the force produces. It sometimes happens, too, where the pattern is very deep, that two or more pairs of dies are used, the first more shallow than the others, in order that the boldness of relief may be brought about more gradually.

A modified form of stamping is sometimes employed where small pieces of metal are to be punched or cut out of the sheet, instead of cavities and convexities being formed. This is effected by the aid of a small kind of press, having a lever-handle governed by the hand of the workman. Various kinds of ornamental pierce-work are produced by these means, the punches affixed to the press being selected according to the work to be done; and the lighter kind of stamping can also be done by similar means, when quickness rather than great force is required.

The third great variety in the mechanical formation of the article to be gilt or silvered, viz. the *brazing* or hammering, has yet to be noticed. If the white metal were of a rigid and unyielding character, it would neither bear the stamping nor the brazing; but it is chosen with reference to these points as well as others; and all such articles as dish-covers, and hollow vessels which are not cast in moulds, are brought up into form by the aid of the hammer. The hammers used for this purpose are made of some hard kind of wood, such as box, and covered with buff leather. There are also *bosses* or supports made of wood, on which the plate of metal is rested while being hammered. With these simple implements the process is conducted; a process calculated to excite some surprise in the mind of a looker on; for the flat sheet of metal gradually loses its original form and assumes curvatures which one would scarcely expect that the metal would bear. But this, like every other mechanical operation, requires that nicety and tact which long practice alone can give. The brazier, by minute changes in the mode of holding the sheet of metal, and in the direction and weight of the blow, forces, or perhaps we may say *entices*, the metal to assume the desired curvature of form. Sometimes a vessel, instead of being brought at once from a flat sheet, is first soldered up into the form of a cylinder or a cone; and this cylinder or cone is transformed into a vase or some other vessel by means of the hammer.

There is a collateral aid, of which the brazier avails himself, to impart something like pattern to parts of his work: this is by the use of *swages*. A swage is a double instrument, analogous (for the sake of familiar illustration) to a pair of scissors, having some kind of device on each of its halves, the one a counterpart of the other. A thin piece of metal being drawn between these two closed halves, is forced to assume a form cor-

responding to them; and thus mouldings, beadings, and raised edges are given to sheets of metal which are in other respects worked into form by the hammer.



[Swaging.]

Let us now gather up the scattered details which have hitherto occupied our attention, and see to what point they lead us. The grand object in view is to bring a mixed white metal into some one or other of the countless ornamental forms which the shop of the gold and silver smith presents to us; and this is effected by casting, by stamping, by pressing, by punching, by hammering, and by swaging, according to the circumstances of each particular case. It thus arises, that the mechanical department of the factory is very extensive, irrespective of the chemical and galvanic arrangements yet to be noticed. The quadrangular ranges of buildings exhibit tier after tier of shops, in which many hundreds of men are thus engaged; each class totally distinct from the others, and carrying on in fact a different branch of manufacture. One department, for instance, comprises the spoon and fork manufacture; in which by means of dies, presses, and stamps the pieces of white metal are brought to the well-known forms of those implements, preparatory to the surface processes.

It often happens, and generally does happen in a large and complicated piece of ornamental plate, that its manufacture from one piece of metal is utterly impracticable; it consists of numerous component pieces, some of which may be more fittingly prepared by casting than by any other of the mechanical processes, others by stamping, others by hammering, and so on; and an important object then is to solder all these pieces together into one complex whole. This brings us to another remarkable department of the factory; one which exemplifies the recent striking advance made in this kind of work. So long as plated-ware was made on the old method, soft or fusible solder alone could be used; because hard solder, which melts only at a high temperature, would endanger the melting of the metal itself which is to be soldered. But the white metal now employed is so hard, and capable of bearing so high a temperature, that solder of a very different kind can be used; a solder, indeed, so refractory that the common process is inapplicable to it. Hence a powerful heat is required, and this heat is obtained by a method patented by M. Delbruck a few years ago, and known as "autogenous soldering," the use of which in England is obtained by licence from the patentee. The method consists in the application of a forcible jet of mixed gases, in an ignited state, to the metal. In one of the ranges of shops are several iron stands or tables ranged in a row, each one contiguous to a jet affixed to a flexible pipe. The gases are forced along this pipe with great violence, by steam power, from another part of the building; and the stream, when issuing from the pipe and ignited, gives out a most intense heat. The articles to be soldered are adjusted to each other, with a little of the hard solder between them, and a little borax to act as a flux; and the pipe is held in the hand of the workman so as



[Soldering.]

to direct the intensely heated jet down upon the metal The apparatus is so perfectly manageable, that the heat can be directed to any particular point; and the solder becoming melted, the two pieces of metal become joined together with a firmness which never could be attained under the older process. The hollow parts of some of the ornaments are filled up with hard metal by similar means, thereby forming a much more solid foundation than the lead and tin used in earlier times.

As the surface of the white metal, by these complicated processes of casting, stamping, hammering, soldering, &c., has become rather soiled and discoloured, it undergoes a thorough cleaning, grinding, and polish-

ing, which is effected by means of emery, sand, or rotten-stone, applied either by means of a grinding-wheel or of brushes, according to the nature of the work.

At length we approach the electro-chemical departments of the factory, those which form the most striking feature of the whole. It is not from their size, for the rooms are but small; it is not from the complex arrangement, for nothing can be more simple and plain than their general appearance; it is not from the number of persons employed, for two or three individuals can coat with gold or silver all the articles which many scores of men have been employed to make. It is not from any of these causes, but from the beautiful exemplification which these rooms exhibit of the application of a scientific principle to productive industry, that we feel this to be the heart and centre of the whole factory. There is the copper-deposit room, the silver-deposit room, and the gold-deposit room, all of which will call in turn for notice.

We have in an earlier paragraph explained, that if a galvanic current passes through a vessel containing a metallic solution, the metal becomes separated from the liquid, and deposited in a solid form. But it is not every surface which is fitted for the reception of this deposit. In the earlier stages of this new art, when it was regarded simply as a curiosity, the metal deposited was always copper, and the surface on which the deposition took place was also metallic. When, however, it was proposed to take electro-types or copies from articles in wax, plaster, or other materials, a necessity arose for some means of imparting to these substances the power of receiving the deposit; and black-lead applied in powder was found to be tolerably well fitted for this object. In the further progress of the art towards the state of a manufacture for commercial purposes, a more complete and efficacious agent was sought, in lieu of black-lead, where the substance on which the deposit takes place is not metallic. The use of a preparation of phosphorus for this purpose, patented, we believe, by Messrs. Elkington, has been the means of coating with gold and silver various beautiful organized substances, of which we shall speak presently.

The silver-deposit room, of which a general sketch is given in the frontispiece, contains a range of tanks or troughs, about a yard in width and the same in height, and three or four yards in length. Wires and rods are placed across and within these tanks, so arranged as to bring the contents of the tanks in connexion with a galvanic battery contained in an adjoining apartment. This battery consists of thirty or forty upright cylinders, about two feet high, with such an arrangement of copper, zinc, and an intervening liquid, as to give rise to a powerful and continuous galvanic current. Two wires, the positive and the negative, extend from this apparatus to the tanks in the deposit-room, so that the contents of the tanks may form part of the galvanic circuit; or, in other words, a current of galvanic electricity is made to pass through the tanks.

In these tanks is contained a solution of a double salt, the cyanide of potassium and silver. This choice of solution is the result of a vast number of experiments, instituted with the view to determine what kind of solution will most fittingly and readily yield metallic silver when exposed to electric action; the selection being guided by numerous little points which can only be appreciated by those immediately engaged in the manufacture. Into these tanks, thus supplied with a silver solution, the white-metal articles are immersed; but before being so they are brought to a perfectly bright and clear surface by being boiled in caustic potash, and afterwards dipped in a solution of aqua-fortis.

The mode of immersing the articles is curious: metallic rods cross the tanks from side to side, and from these the various articles are suspended by wires temporarily affixed to them. Spoons, forks, plates, salvers, cups, candlesticks, candelabra, and a countless assemblage of other articles, are thus suspended side by side, but without being in contact; the general arrangement of the tank, as to the pointing of the wires, &c., being regulated according to the kind of articles to be coated. The galvanic current, conducted through the tanks thus occupied, and brought into connexion with all the various parts by a sufficiency of conducting wires and rods, decomposes the solution, liberates the silver from the other component elements, and deposits it in a beautifully clear and equable layer on the articles hanging in the tank. By increasing or decreasing these four agents—the intensity of the galvanic current, the quantity of the current, the strength of the solution, and the time of immersion—any desired thickness of silver may be deposited; the determination of all these points being a matter of experience on the part of those employed. As, from the peculiar nature of the process, the quantity of silver deposited cannot be ascertained while the deposition is going on, it is determined by weighing the article accurately before immersing it in the solution, and after it is finished; the former weight subtracted from the latter, gives the weight of silver deposited. If the solution be acted on for a long time together, it would become exhausted of its silver, and the process would stop for want of working materials; to obviate which, sheets of pure silver are suspended in the tanks at intervals, and the silver from these sheets becomes dissolved as fast as deposition takes place; so that the solution is constantly receiving on the one hand an equivalent for what it is giving up on the other. These sheets of silver are gradually eaten away till they present nothing but a delicate web of lace-like fibres, extremely beautiful in appearance.

The gold-deposit room, of smaller dimensions, presents to view operations nearly analogous to those here noticed. The quantity of work being generally smaller in gold than in silver, a smaller working agency is required; and the galvanic battery is here placed by the side of the depositing tank. The solution is analogous in composition to that for the silver; being a double salt, the cyanide of potassium and gold. In the silver deposit, the solution is used quite cold; but in the gold deposit it is used at a temperature of more than a hundred degrees, a ring of gas-jets being so arranged beneath the tank as to heat the solution to the required temperature. Near the tank are other vessels containing aquafortis and other liquids, into which the articles are dipped before being immersed in the deposit-tank. If small articles of jewellery, or anything that can be strung upon a wire, are to be gilt (and this is becoming an extensive department of the operations), a wire-ful of such is dipped in the solution while the galvanic action is going on; and by a little agitation, all the articles are coated with pure gold in a space of time hardly credible to those who witness it for the first time. We saw ten gross of coat-buttons strung upon a wire and all perfectly gilt by an immersion of less than one minute! A strip of pure gold is bent round the interior of the tank, as a source of supply to renovate the exhausted solution.

Remarkable as these processes are, yet perhaps the most strikingly curious are those in which any small delicate natural productions are coated with silver or gold. In the show-rooms of the factory are many little slips of holly and other plants, coated some with pure gold, some with silver, and others with copper; all exhibiting the minute details of leaf and fibre with exquisite clearness, and every part, to the mere prickles on the edges of a leaf, being coated evenly and equally

with pure metal. So complete is the method by which this is now done, that a stranger may see a small slip from a shrub dipped in a solution of phosphorus, and immediately afterwards in the deposit-tank, where it is instantly coated with the metal. There are also specimens of butterflies and other insects, coated with gold or silver in the same manner, and exhibiting much of the delicate mechanism of the surface. It is impossible adequately to foretel the vast number of useful applications which may one day result from this extremely facile mode of imparting a coating of absolutely pure metal to almost any substance whatever.

But to return to the electro-plate. Many highly finished articles present a silver exterior with a gilt interior. This is effected by the electro process thus: the article is first silvered in the way just described: and the surface is then coated with some protective composition which will resist the deposition of gold. The article is next transferred to the gold-deposit room, where a film of gold is deposited on the side or surface required, without attacking the opposite side. This principle is carried still further, in some kinds of ornamental plate, by interspersing gold among the silver in very tasteful array; the silver, in every such case, being protected from the subsequent action of the gold at every place where the latter metal is not required to be deposited.

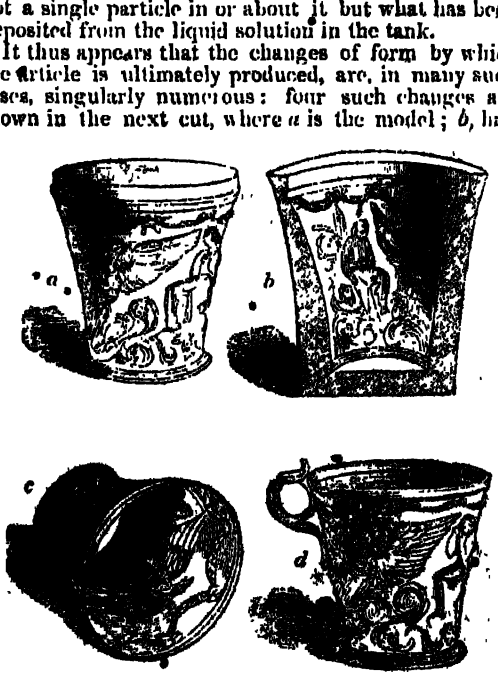
The reader will have observed, that in all the details through which we have passed, the operations have had relation to a substance or body of white metal coated with a layer of pure gold or silver. But before we trace these gilt and silvered articles through the finishing processes yet to be noticed, it is necessary to go back a little, and glance at the manufacturing history of a class of articles which are perhaps the highest triumph of electro-metallurgy; viz. those in which not only the surface, but the actual substance of the article is wholly formed by electro-deposition. To manufacture a silver vase or salver from a liquid solution, seems a strange thing to undertake; yet it is scarcely an exaggeration of things actually done, as the following details will show.

The interchange between mould and model, mould and model again, is greater for this department than for mere surface deposit. Supposing an elaborate design to be wrought in wax by the modeller of the intended article of plate, this wax model is moulded in lead, from which again a brass pattern is cast, and this pattern is brought up to the required degree of finish. From this model or pattern a second mould is made; not in sand as for surface deposit, but in a very peculiar elastic composition, formed of glue, caoutchouc, and other materials. The pattern is enclosed in a frame or border, and the melted composition is poured upon it. When cold this composition is removed from the pattern in one piece, its elastic nature being such that it may be loosened and removed from under-cut and deep hollows in the device, such as would be quite unmanageable in a rigid material. Then from this mould a model or pattern is cast in a composition of wax, suet, and phosphorus, and the model thus produced forms a surface on which electro-deposition is to take place. The elastic mould is removed with facility from the model, by reason of its peculiar yielding quality. The composition model is next transferred to the copper-deposit room, where a large tank, vessels with the preparing liquid, and an adjacent battery, furnish the means for bringing about the deposition of copper on the surface of the wax model. In the tank is a solution of sulphate of copper, and in an adjoining vessel is another solution of nitrate of silver. The choice of ingredients altogether has been the result of an elaborate series of inquiries, and is such that the phosphorus contained in the composition, induces the deposition of a thin layer of silver from the nitrate solution. This being effected, a preparation is afforded for the subsequent deposit; and the model is then immersed in the solution of sulphate of copper. The galvanic current, acting in the manner before described, decomposes the metallic solution, and precipitates the liberated copper on the surface of the model (or rather, on the slight silver layer already covering it), coating it with a layer of metallic copper more or less thick according to the circumstances under which the operation is conducted.

Here, then, we have a wax or composition model coated on the exterior with an equable layer of fine pure copper. At the factory we saw a large dish of most elaborate workmanship in the tank, and in the act of being coated with a glowing and richly-coloured film of copper; the dish was made of the wax composition, and had been brought to that form by the processes already enumerated: it was in an intermediate stage between the preparatory and final depositing processes, and exhibited the real colour of copper in a more uncontaminated state, perhaps, than any other department of manufacture exhibits it.

As the wax is only a mere foundation for the copper, so is the copper only a step towards the ultimate gold or silver article, and both have to be destroyed in succession. In the first place, when the copper deposition is properly completed, the wax composition is melted out, leaving a mere copper shell, the *interior* of which is an exact mould of the *exterior* of the wax model. This copper mould, after a further preparation, is immersed in the gold or the silver solution, the interior being prepared for the reception of the deposited metal, but the exterior protected from it by a resisting composition. Then, by the agency before described, the silver is deposited in the copper shell or mould, to any thickness that may be required, the particles of metal ranging themselves equally over every part of the interior. This being completed, the specimen is removed, and the copper is exposed to the action of an acid which gradually eats it away without injuring the silver; and the result is the production of a pure and solid silver ornament or article of table plate, having not a single particle in or about it but what has been deposited from the liquid solution in the tank.

It thus appears that the changes of form by which the article is ultimately produced, are, in many such cases, singularly numerous: four such changes are shown in the next cut, where *a* is the model; *b*, half



of the elastic mould; *c*, the deposited copper when taken therefrom; and *d*, the finished vessel of silver.

Here we leave the electro-deposit rooms, and turn our attention briefly to the departments of the factory where the finishing processes are being carried on. The silver and gold articles, whether of solid deposit or superficial deposit, have a singularly dead appearance when removed from the solution; the silver, in particular, presenting a hue which, to a stranger, does not appear to bear much analogy to that of silver. To give a somewhat more metallic appearance to the surface is the object of one of the first operations after the deposition.

The silver is well rubbed with 'scratch-brushes' made of brass wire; and is then burnished. To give this burnish is the work of a large number of females, who work in a part of the factory appropriated wholly to them, and who earn a respectable living by this employment. The burnishing is effected chiefly by



[Burnishing.]

pieces of blood-stone, a very peculiar kind of Derbyshire stone, which, from its hardness and smoothness, is highly valuable in burnishing gold and silver work. The burnisher, which is fixed in a handle, and is held in such a manner as to give considerable power of pressure on the work, is first moistened to prevent it becoming too hot, and is rubbed rather forcibly over every part of the article which is to be burnished, by which a surface of brilliancy is produced.

There is a process to which large metallic surfaces are subjected, after the deposition, which strengthens the close and intimate union which has taken place between the deposited metal and the foundation metal beneath it: this is *planishing* or *hammering*.

The hammering seems to have the effect of bringing the metallic particles into more intimate



[Planishing.]

union than they were before, and to give an elastic and homogeneous texture, highly conducive to the durability of the article. The pieces of plate are placed on a supporting boss or block, and are hammered with a highly polished steel hammer in every part. Not only is this done with flat articles which have been electro-plated on white metal, but also on articles of solid deposit themselves; and the fine sonorous 'ring' which these emit when struck, shows that the atoms of silver and gold, although thrown down from a liquid solution, have assumed the aggregate form of a sound continuous sheet of metal—a circumstance not among the least curious which the range of processes exhibits.

Another class of finishing operations is that which relates to the engraving, and which occupies the attention of a different set of workmen from those yet noticed. Many of the finer articles of plate have ornamental devices put upon them by the engraver, who works with tools somewhat similar to those employed by other engravers. Sometimes, where the engraving is made on an article plated with silver or gold on a cheaper metal, the costly metal is either deposited more thickly than usual on the part to be engraved, to give scope for the incisions of the graver without reaching the inferior metal beneath, or an extra deposit is precipitated on the engraved part after the engraving is completed.

Here we close our rapid sketch of a factory which exhibits a greater number of distinct and often widely different processes than almost any which we have had to notice in the 'Magazine.' There may be some in which the artistic features are carried to a greater height, some more mechanical, some more chemical; but for a combination of all these three—taste, mechanical operations, and chemistry, or rather electro-chemistry—there are probably scarcely any to equal it. Many of the processes, too, are altogether out of the common run of things, and our thanks are all the more due for the liberality which granted us access and facilities for observing the operations.



[Frederic I. Barbarossa.]

THE RÖMER AT FRANKFORT.—No. II.

Frederic I., the 'Barbarossa' of the Italians, the 'Defender' of the Germans, is one of the favourite national heroes of his countrymen, and, like our own Arthur, the popular legend relates of him, that, surrounded by his heroes, he yet lies in an enchanted slumber within some mountain-cavern, and that he will reappear when the charm is dissolved, to unite the whole German people under one sway, and lead them on a new career of happiness and glory.

Frederic I. was of the house of the Hohenstauffen, the son of Frederic, Duke of Suabia, and nephew to the Emperor Conrad III. He was born in 1121, distinguished himself early by his talents and his bravery, and had accompanied his uncle Conrad in the unsuccessful crusade which he made with Louis VII. of France. Conrad died soon after his return, and knowing the distracted state of the German empire, recommended Frederic as his successor, in preference to his youthful son. The propriety of the preference was acknowledged by the unanimous voice of the Diet assembled at Frankfort on the 9th of March, 1152, and four days later he was crowned at Aix-la-Chapelle. He reigned till 1190, when he was drowned in crossing the Calycadnus on horseback, while leading another crusade.

The events of his important and interesting reign belong to history; we give his character, drawn by his own countryman, A. Schott, as illustrative of our engraving.

The memory of Frederic I., says Mr. Schott, is so completely united with everything relating to the prosperity and fame of our people, that we always name him first when we recall the glorious days of Germany; days which we ascribe to him with almost enthusiastic love. In every land where the German tongue is spoken, no name is so commonly bestowed on their sons, alike by the highest and the lowest, as this auspicious and hopeful name, which this emperor first made famous in history, and which forms a perennial monument such as is enjoyed perhaps by no other hero.*

The endowments of his body and mind corresponded with the position that fate had assigned him. His frame was powerful, and of full height; his blue eyes shone serenely and firmly: his light hair curled above his proud arched and white forehead; around his ruddy cheeks and noble mouth grew the strong red beard from which the affrighted Italians gave him the enduring name of Barbarossa. In hunting and other bodily exercises none could excel him; in war he was not only the careful general, the leader whose clear and powerful voice swayed widely over the conflict, but in contempt of death and danger he competed with the bravest.

With all the dignity of a sovereign, which Frederic never forgot, he was friendly in intercourse, and not disinclined to social mirth. Under the protection of the peace which he gave, in contact with more polished people whom he had introduced, the rough manners of the Germans became ameliorated, by means of the

* Fried-reich (the origin undoubtedly of the German Friedrich) is "rich in peace:" has not the German writer over-estimated the influence of the individual in the frequent choice of the name?

notions of unspotted knighthood, the tender reverence for woman, the ascendancy of elegant manners, which we call courtly, because in courts, and particularly in Frederic's, they have their abode. Art and science, equally favoured, made rapid advances. To the deep spiritual movement of his time we are indebted for that form of architecture which secures for Germany eternal fame in this department: his were also the "old times of noble song," in which princes disdained not to practise the art, and in which the great poets were formed who associated the honour of German arms with the yet higher fame of spirituality and manly devotion. The High Schools, first established in this century, he took under his particular protection. Among the sciences history had his preference: he read its volumes diligently, and the example of its more splendid characters guided his steps.

Frederic's bosom contained the heart of a hero: strong in love as in anger, great in resolution, rapid in action, in beautiful harmony betwixt circumspection and rashness, he never appeared less than royal. Master of himself, he was temperate in every enjoyment; of an understanding so calm and clear that he, unmoved, seized everything in its true light, and weighed quickly and justly the relations of the present and the future in every action; sparing, yet at proper times of princely liberality; severely just; faithful and open; in decision independent, but considerate and open to good advice; in prosperity discreet, in adversity dignified and firm; in faith religious, rather from will than conviction, but full of the devotion which distinguished his age; animated by reverence towards the visible church, its head, and its servants, even when fighting against them. His memory was so excellent that he would accost by name, after years of absence, any one whom he had once seen; and what deserves still higher praise, he never forgot his friends. He had not learnt to love his enemies, as a German bishop once expressed it to an unfriendly pope, but he was ever inclined to pardon the repentant, and was implacable only against traitors. The painter, therefore, might justifiably, in the modest village church of Hohenstauffen, ornament his picture with the honourable words—"the dread of the wicked, the beloved of the good."

As a counterpoise to this patriotic eulogy we add his character as sketched by a writer in the 'Penny Cyclopædia.' It will be seen that he was indeed not undeserving of the love and admiration of his countrymen:—"Frederic was a brave and liberal prince, equally firm in prosperity and adversity. These great qualities veiled the pride and ambition which were unquestionably in part the motives by which he was actuated. He possessed an extraordinary memory, and a greater extent of knowledge of different kinds than was common in that age. He esteemed learned men, especially historians, and wrote in Latin memoirs of some parts of his own life, which he left to Otho, bishop of Freysingen, whom he appointed his historian. He was of a noble and majestic appearance, and, notwithstanding his disputes with the popes, a friend to religion."

The artist, C. F. Lessing, has chosen the period when Frederic was attending his uncle on his first crusade as the most appropriate and characteristic time for individualizing his portraiture. The figure is manly and imposing, and the costume well selected. But we must allow M. Schott to tell us all that the artist has attempted to represent. "The cloudless, deep blue, Oriental sky spreads itself above the simple-minded German hero, whose cross and pilgrim's scrip, as well as the Holy City in the background, distinguish him as a crusader. Thoughtfully he gazes on the distance; even on the Syrian soil meditating on his native home, whither he is to precede his uncle, as civil war again threatens to commence its ravages. The handsome manly features betray deep earnestness, half angry and half melancholy; in their expression dwell clearness, strength, and mildness, the characteristics by which he secured the future honour of his name, by which he became Frederic *the protector* of his people."

IRISH GOLD-MINES.

IRELAND furnishes an instructive instance of a point in commercial economy which often perplexes persons who think that gold and wealth are synonymous terms. Ireland contains gold in some of its mountains and rivers, of such pure quality as to be worth exchanging for standard gold, weight for weight; and yet it is hardly worth collecting, simply on account of the ratio which the labour of collecting bears to the value of the substance collected—a ratio which determines the value of all gold-mines, whether of Peru or elsewhere; and which will explain how it arises that the American countries which contain mines of gold and silver are, after all, anything but wealthy countries.

The gold of Ireland is found in the county of Wicklow, and the history of its discovery and working is rather curious. The mines, if mines they may be called, are situated in the Croghan mountains, which separate Wicklow from Wexford. The discovery is said to have been made by a schoolmaster named Dunaghoo, about the year 1770. According to an account, communicated to Sir Joseph Banks, this man used frequently to talk about the richness of the valley in gold: that he used to go out at night, in search of the treasure; that the neighbours thought him deranged in his intellect; and that the idea of the golden store did at length turn his brain. Another account states that the schoolmaster, after making the veritable discovery, kept his secret to himself for twenty years; but, on marrying a young wife, he revealed the secret to her; and she, thinking he was mad, revealed it to her friends, by whom it was speedily ascertained that the statement itself was true. The Irish peasantry, with the love of legendary tales which distinguishes them, have filled out all the details of a very marvellous version of the discovery, in which perhaps the real fact itself is buried in a whole cloud of wonders.

Let the circumstances of the discovery have been what they may, it was not till a few years afterwards that gold was found in any considerable quantity. In 1796 a man, while crossing a brook in the valley, picked up a piece of nearly pure gold half an ounce in weight. This circumstance was soon hinted abroad; and in a very short time persons of both sexes and of all ages, very poor and moderately poor, hale and decrepit, were seen groping among the earth and sand of the valley, washing it in the brook, and trying to detect the glitter of the little bits of gold. It was not a chimera, like much gold-seeking that we hear of; for in the course of two months, which intervened between the discovery of the half-ounce piece and the interference of the government, the peasantry realized several thousand pounds by the gold which they found and sold. Mr. Fraser, in a statistical survey of the county of Wicklow, published in 1801, said:—"Mr Graham, a gentleman who resided close to the spot, who was present all the time, and who purchased a considerable quantity of gold, to the amount of above seven hundred pounds, from the country-people, told me that according to the best calculation there was upwards of ten thousand pounds given for the gold found and sold on the spot, the average paid for which was 3*l.* 15*s.* per ounce, which makes it that 2666 ounces were found in that short space of time (from 24th

of August to 15th of October)." It was not an ore of gold that was thus found; it was metallic gold, of an extraordinary degree of purity. The assay-master at the Mint found that, in two specimens submitted to him for analysis, there were nearly twenty-two parts of absolutely pure gold in twenty-four of the total weight; and it is said that the Dublin goldsmiths gave weight for weight, in standard gold coin, for it. The gold was found in pieces of various sizes, from the smallest perceptible atoms to pieces weighing several ounces. There was one piece found of the extraordinary weight of twenty-two ounces: it was of flattish form, measuring about four inches in length, three in breadth, and from half an inch to an inch in thickness; it was sold for eighty guineas, and a gilt cast of it was deposited in the museum of Trinity College, Dublin.

We alluded above to the interference of government. In the month of October, 1796, two companies of the Kildare militia took possession of the ground by order of government; and a sum of money was granted for conducting the mining in a systematic and proper manner, for the benefit of those to whom the mineral might belong. But it was soon found that there was nothing which could be called a *mine* of gold. Commissioners were appointed to explore the mountains with great care and minuteness; and they reported, that "numerous trials were made by driving and sinking in the veins previously known and subsequently discovered. The mineral substances obtained were subjected to the operations both of fire and amalgamation, but in no instance was a particle of gold elicited from them—either by the one or the other operation." The persons employed by the government found only scattered pieces of gold here and there; and the total produce of two years' seeking was valued at less than four thousand pounds. It became evident that, whatever might be the source of the gold, there was none to be found, as an inherent ingredient, in the veins which traverse the mountains; and in 1798 the government abandoned the project altogether. It was resumed again for a short time in 1800, but soon afterwards finally abandoned by the government.

For forty years after this period the country-people used occasionally to employ themselves in seeking for gold among the mountains. But the pieces found were so exceeding small, and this so seldom, that even in so poor a country as Ireland they found it more profitable to employ themselves in field-labour than to continue the search; except in some few cases, where a group might be seen raking among the sand and dirt brought down from the mountains, or a solitary person looking keenly along the banks of the streams. At length, about four or five years ago, a company, or joint-stock party, took a lease of the district, and set fifty or sixty persons to work, under the superintendence of a miner from Cornwall. The plan of proceeding was rather rude and primitive; for no attempt was made to trace the gold to its source; the arrangements being limited to obtaining as much gold as they could for the clay that borders the stream.

There seems reason to believe that, at some former period, Ireland must have yielded gold in greater abundance than in modern times. Scarcely a year passes without some golden relic being dug up or discovered in ancient buildings and ruins, such as corslets, bridles, chains, rings, bracelets, &c.; and almost every private collection of antiquities in Ireland contains some or other of such specimens. That a country may contain gold, and yet be commercially poor, is, however, evidenced in Ireland as well as elsewhere.

Ireland, too, at one time, contained pearls; or at least the pearls found in a species of mussel on the coasts were once deemed of importance. Sir Robert Reading, in a letter written in 1688, described the pearl-mussels which he had himself seen on the shores of the county of Down. He says he saw the mussels "lying in part opened, putting forth their white fins, like a tongue out of the mouth, which directs the eye of the fisher to them, being otherwise black as the stones in the river." The insides of the shells were described as having a pearly colour, and nearly the consistence and texture of mother-of-pearl, while the pearls themselves were found at the smaller end of the shells. He said, "The shells containing the best pearls are wrinkled, twisted, or branched, and not smooth and equal, as those that have none; which the fishers so well know, that though they are carefully watched, yet they will open such shells under the water, and conceal the pearls. Those pearls, if once dark, will never clear upon any alteration in the health or age of the mussel; and if the first seed be black, all the coats superinduced will be clouded." He adds, that he used to see a large number of marketable pearls offered for sale every summer. One which he mentions weighed thirty-six carats, and was sold for fifty shillings, although it was afterwards valued at forty pounds. A miller, on one occasion, found a pearl which he sold for five pounds ten shillings; the purchaser sold it again for ten pounds, to a person who again sold it to Lady Glenarchy for thirty pounds, and this lady afterwards refused eighty guineas for it from the Duchess of Gordon.

In the 'Survey of Down' the mode of fishing for the pearl-mussels, as practised in the river Bann, is thus described:—"The common method of fishing for these mussels in the Bann is very simple. In the warm months, while the river is low and clear, the poor people wade into the water, and some with their toes, some with wooden tongues, and others with sharp sticks thrust into the opening of the shells, take them up. But these methods can be practised only in shallow water; whereas the large mussels and the greater quantities are found in deep smooth water, as is experienced in the pearl-fisheries of the East and West Indies, where they fish by divers, sometimes above sixty feet under water. If dredges or other mechanical contrivances were used to fish the deep waters of the Bann, they might probably meet with better success in the size, and, it may be, in the colour of the pearls."

Dust-Storms of New South Wales.—I several times observed at Bathurst a phenomenon by no means unusual on the large plains of New South Wales in dry weather, being a procession across them of tall columns of dust—whirlwinds in fact, which preserve a nearly uniform diameter throughout their whole length, the upper end seeming to vanish off or puff away like light smoke, and the lower apparently touching the earth. They move in a perpendicular position, quietly and majestically gliding along one after another; seeming, at the distance I saw them, to be from seventy to a hundred feet high, and about twenty broad. Thus viewed, they do not appear to travel particularly fast; but Mr. Meredith tells me he has vainly endeavoured to keep pace with them for a short time, even when mounted on a fleet horse. When they are crossing a brook or river, the lower portion of the dust is lost sight of, and a considerable agitation disturbs the water; but immediately on landing the same appearance is resumed. As some vanish, others imperceptibly arise and join the giant-waltz; and when I first observed this most singular display, I amused myself by fancying them a new species of genii relaxing from their more laborious avocations and having a sedate and stately dance all to themselves. When the dance ends, these dusty performers always appear to sit down among the neighbouring hills.—*Mrs. Meredith's Notes and Sketches of New South Wales.*



[The Lady Vis[illegible] the Knight in the Stocks.]

HUDIBRAS.—No. VIII.

THE First Part of Hudibras was published in 1663, became extremely popular, and several worthless imitations were rapidly produced. One of them, called the 'Second Part of Hudibras,' was published in the same year, of which the only notice taken by Butler was in the third Canto of the Second Part, where the Knight tells Whachum, the conjuror's assistant, who pretends to some knowledge of his history—

> "That paltry story is untrue,
> And made to cheat such gulls as you."

Other imitations were the Dutch and Scotch Hudibras, 'Butler's Ghost,' 'The Occasional Hypocrite.' In 1674, however, Butler himself published the Second Part, on which we are now about to enter.

The First Canto of this Part contains merely an account of the interview of the Widow with the Knight, still in the stocks, beginning with a burlesque imitation of the Fourth Book of the Æneid, and the following description of Fame, embodying a satirical character of newspapers, that will apply almost as well now as then:—

> "There is a (all long-sided dame,
> (But wond'rous light) ycleped Fame,
> That like a thin camelion boards
> Herself on air, and eats her words:
> Upon her shoulders wings she wears
> Like hanging sleeves, lin'd thro' with ears,
> And eyes, and tongues, as poets list,
> Made good by deep mythologist.
> With these she through the welkin flies,
> And sometimes carries truth, oft lies;
> With letters hung like eastern pigeons,
> And Mercuries of farthest regions;
> Diurnals writ for regulation
> Of lying, to inform the nation;
> And by their public use to bring down
> The rate of whetstones in the kingdom:
> About her neck a packet-mail,
> Fraught with advice, some fresh, some stale,
> Of men that walk'd when they were dead,
> And cows of monsters brought to bed:
> Of tailorous big-as pullets eggs,
> And puppies whelp'd with twice two legs;
> A blazing-star seen in the west,
> By six or seven men at the least."

This 'tattling gossip' having informed the Widow of his situation, she determines to see him, to ridicule him, and to liberate him:

> "This b'ing resolv'd, she call'd for hood
> And usher, implements abroad

Which ladies wear, beside a slender
Young waiting damsel to attend her,
All which appearing, as she went,
To find the Knight in limbo pent.
And 't was not long before she found
Him and his stout squire in the pound;
Both coupled in enchanted tether,
By farther leg behind together:
For as he sat upon his rump,
His head, like one in doleful dump,
Between his knees, his hands apply'd
Unto his ears on either side;
And by him, in another hole,
Afflicted Ralpho, cheek by jowl:
She came upon him in his wooden
Magician's circle on the sudden,
As spirits do t' a conjurer,
When in their dreadful shapes th' appear."

The dialogue is full of wit, sometimes not of the most strait-laced description, in which she insinuates the disgrace of his defeat, and he, with much subtlety, maintains that his defeat involves no loss of honour. A short specimen must suffice—

"Quoth she, I grant it is in vain
For one that 's basted to feel pain,
Because the pangs his bones endure
Contribute nothing to the cure;
Yet honour hurt, is wont to rage
With pain no med'cine can assuage.
Quoth he, that honour 's very squeamish,
That takes a basting for a blemish;
For what 's more hon'rable than scars,
Or skin to tatters rent in wars?
Some have been beaten till they know
What wood a cudgel 's of by th' blow:
Some kick'd until they can feel whether
A shoe be Spanish or neat's leather;
And yet have met, after long running,
With some whom they have taught that cunning.
The farthest way about, t' o'ercome,
I' th' end does prove the nearest home;
By laws of learned duellists,
They that are bruis'd with wood or fists,
And think one beating may for once
Suffice, are cowards and poltroons:
But if they dare engage t' a second,
They 're stout and gallant fellows reckon'd.
Th' old Romans freedom did bestow,
Our princes worship, with a blow:
King Pyrrhus cur'd his splenetic
And testy courtiers with a kick,
The Negus,* when some mighty lord
Or potentate 's to be restor'd,
And pardon'd for some great offence,
With which he 's willing to dispense,
First has him laid upon his belly,
Then beaten back and side t' a jelly;
That done, he rises, humbly bows,
And gives thanks for the princely blows:
Departs not meanly proud, and boasting
Of his magnificent rib-roasting.
The beaten soldier proves most manful,
That, like his sword, endures the anvil;
And justly 's held more formidable,
The more his valour 's malleable:
But he that fears a bastinado,
Will run away from his own shadow:
And tho' I 'm now in durance fast,
By our own party basely cast,
Ransom, exchange, parole, refus'd,
And worse than by the enemy us'd;
In close catasta† shut, past hope
Of wit, or valour, to elope:
As beards, the nearer that they tend
To th' earth, still grow more reverend;
And cannons shoot the higher pitches,
The lower we let down their breeches;
I 'll make this low dejected state
Advance me to a greater height.

The Widow then urges the influence of wealth in the

* The Negus is the Emperor of Abyssinia.
† Catasta is Latin for the stocks.



"The Knight and Squire released from the Stocks."

formation of marriage, which Hudibras acknowledges in a most ingenious dissertation upon its power

"Quoth she, I grant you may be close
In hiding what your aims propose:
Love-passions are like parables,
By which men still mean something else:
Tho' love be all the world's pretence,
Money 's the mythologic sense,
The real substance of the shadow,
Which all address and courtship 's made to.
Thought he, I understand your play,
And how to quit you your own way;
He that will win his dame, must do
As Love does, when he bends his bow,
With one hand thrust the lady from,
And with the other pull her home.
I grant, quoth he, wealth is a great
Provocative to am'rous heat;
It is all philters, and high diet,
That makes love rampant, and to fly out:
'Tis beauty always in the flower,
That buds and blossoms at fourscore:
'Tis that by which the sun and moon
At their own weapons are outdone:
That makes knights-errant fall in trances,
And lay about 'em in romances:
'Tis virtue, wit, and worth, and all
That men divine and sacred call;
For what is worth in any thing,
But so much money as 't will bring?
Or what but riches is there known
Which man can solely call his own;
In which no creature goes his half,
Unless it be to squint and laugh?
I do confess, with goods and land
I 'd have a wife at second hand."

But though the Knight thus boldly avows the influence of riches, he is by no means ignorant of the poetry of love, though his mistress declares that his enthusiasm is merely rhetorical. He tells her

"Love in your heart as idly burns
As fire in antique Roman urns,
To warm the dead, and vainly light
Those only that see nothing by 't."*

And when she pretends to doubt his constancy, he tells her—

"The sun and day shall sooner part,
Than love, or you, shake off my heart;
The sun that shall no more dispense
His own, but your bright influence:
I 'll carve your name on barks of trees,
With true love-knots and flourishes;
That shall infuse eternal spring,
And everlasting flourishing;
Drink ev'ry letter on 't in stum,
And make it brisk champaign become:
Where'er you tread, your foot shall set
The primrose and the violet;
All spices, perfumes, and sweet powders,
Shall borrow from your breath their odours;
Nature her charter shall renew,
And take all lives of things from you;
The world depend upon your eye,
And when you frown upon it, die.
Only our loves shall still survive,
New worlds and natures to outlive;
And like to heralds' moons, remain
All crescents, without change or wane."

Which she ridicules in the following admirable satire on the exaggerated panegyrics of poetical lovers:

"Sir Knight, you take your aim amiss;
For you will find it a hard chapter
To catch me with poetic rapture,
In which your mistery of art
Doth show itself, and not your heart;
Nor will you raise in mine combustion,
By dint of high heroic fustian:
She that with poetry is won,
Is but a desk to write upon;
And what men say of her, they mean
No more than on the thing they lean.
Some with Arabian spices strive
To embalm her cruelly alive;
Or season her, as French cooks use
Their haut-gouts, bouillon, or ragouts;
Use her so barbarously ill,
To grind her lips upon a mill,
Until the facet doublet doth
Fit their rhymes rather than her mouth;
Her mouth compar'd t' an oyster's, with
A row of pearl instead of teeth;
Others make posies of her cheeks,
Where red and whitest colours mix;
In which the lily, and the rose,
For Indian lake, and cerruse goes.
The sun and moon by her bright eyes
Eclips'd, and darken'd in the skies,
Are but black patches that she wears,
Cut into suns, and moons, and stars:
By which astrologers, as well
As those in heav'n above, can tell
What strange events they do foreshow
Unto her under-world below.
Her voice, the music of the spheres,
So loud, it deafens mortals' ears;
As wise philosophers have thought,
And that 's the cause we hear it not."

The debate continues through some hundreds of lines, and is ended by her stipulating that, to prove his love he shall submit to a whipping: telling him—

"It is an easier way to make
Love by, than that which many take.
Who would not rather suffer whipping,
Than swallow toasts of bits of ribbon?*
Make wicked verses, treats, and fairs,
And spell names over with beer-glasses?
Be under vows to hang and die
Love's sacrifice, and all a lie?"

The Knight readily consents, and thus concludes the Canto:—

"Quoth he, I do profess and swear,
And will perform what you enjoin,
Or may I never see you mine.
Amen, (quoth she) then turn'd about,
And bid her squire let him out.
But ere an artist could be found
T' undo the charms another bound,
The sun grew low, and left the skies,
Put down (some write) by ladies' eyes
The moon pull'd off her veil of light,
That hides her face by day from sight,
(Mysterious veil, of brightness made,
That 's both her lustre and her shade)
And in the lanthorn of the night,
With shining horns hung out her light;
For darkness is the proper sphere,
Where all false glories use t' appear.
The twinkling stars began to muster,
And glitter with their borrow'd lustre:
While sleep the weary'd world reliev'd,
By counterfeiting death reviv'd.
Our valy thought it best to adjourn
His whipping penance till the morn,
And not to carry on a work
Of such importance in the dark,
With erring haste, but rather stay,
And do 't in th' open face of day;
And in the mean time, go in quest
Of next retreat to take his rest."

* This alludes to the belief in the secret of a perpetual lamp, which was burned in tombs, supposed to have been possessed by the ancients and the Rosicrucians, and of which there is an account in the 'Spectator,' No. 379.

* It was one of the freaks which has been recorded of the gallants of the age, to swallow bits of ribbon worn by their mistresses

THE WINE-DISTRICTS OF PORTUGAL AND MADEIRA.

There are circumstances connected with the wine-districts of Portugal which have given a peculiar feature to the intercourse between that country and England. If the natural course of commerce had been followed, and English wine-drinkers had consulted their own taste alone in their purchases, a result would have been brought about very different from that which has been witnessed.

The Portuguese wine is principally the well known *Port*, a kind perhaps better known in this country than any other. It is shipped from Oporto, and we may hence derive its name either from the country or from the city. We will first notice, from Dr. Henderson's work, the chief points in the cultivation of the district, and then glance at the regulations which have given such an artificial tone to the port-wine trade.

The wine country or district of the Cima de Douro, or Upper Douro, commences about fifty miles from the harbour of Oporto, and presents a succession of hills on both sides of the river, which afford the choicest exposures, and such loose and crumbling soils as have been shown to be most propitious to the culture of the vine. The whole of this district is under the superintendence of a chartered company, called the 'General Company for the Cultivation of the Vineyards of the Alto Douro.' The vintages are usually divided into two principal classes:—viz., Factory wines (*vinhos da Feitoria*) and secondary wines (*vinhos de ramo*). The factory wines are again divided into *vinhos de embarque*, or assorted wines, for exportation to England; *vinhos separados*, or assorted wines for exportation to the Portuguese colonies or other foreign countries, or for home consumption. The vinhos de ramo are used partly for distillation, and partly for the supply of the taverns in Oporto, &c.

In the territory of the Cima de Douro, the vines are in general kept low, and trained on poles. Many different species are cultivated, some of which are for producing a wine of strong and full body, while others are destined for a milder and sweeter wine. As soon as the grapes begin to shrivel, they are gathered and introduced into broad and shallow vats, where they are trodden along with the stalks; and this operation is repeated several times during the fermentation, which, in the case of the superior wines, continues about seventy-two hours. When the liquor has ceased to ferment, it is removed into large tuns, containing from eight to twenty pipes each. After the fair of the Douro, which commonly takes place in the beginning of February, the wine is racked into pipes, for the purpose of being conveyed down the river into the stores of the Factory or of the wine-merchants at Oporto. To that which is reserved for exportation a quantity of brandy is added when deposited in *armazens* or stores; and a second portion is thrown in before it is shipped, which is generally about twelve months after the vintage.

The establishment of the Wine Company at Oporto arose out of the adulteration which some of the merchants effected on the wine, by adding to it a larger quantity of brandy than is ever put in any other sort of wine. But this establishment, good in its origin, soon produced very pernicious effects. In the beginning of the last century a commercial treaty was made between England and Portugal, by which England offered to the wine of Portugal a decided advantage in our markets, on condition that Portugal took our woollens; and this led to a great export of Portugal wines to England. Down to about the year 1730, no brandy was added to the Oporto wines; but after that time the practice of so adulterating them, under the plea of making them bear the voyage better, came into vogue, and increased to a great degree. The English factors of Oporto addressed in 1754 a letter to their agents in the Alto Douro, complaining that "the grower, at the time of the vintage, is in the habit of checking the fermentation of the wines too soon, by putting brandy into them whilst fermenting." This complaint, and others about the same time, probably led to the formation of the Company: for the quality of the wine became by adulteration so bad, that the demand for it lessened, the market-price lowered, and the cultivators began to experience distress. Upon this, certain individuals at Oporto, in conjunction with the proprietors of the vineyards, succeeded in persuading the Portuguese government to sanction the formation of a joint-stock company for the protection of the wine-trade of the district. The professed object of these persons were—"to encourage the culture of the vineyards; to secure the reputation of the wines, and the support of both the one and the other by fixed prices; to promote in consequence inland and foreign commerce; and finally to ensure the preservation of the health of his majesty's subjects."

By royal letters patent, granted by the government of Portugal, these persons were authorized to form a company, with a capital of one million eight hundred thousand crowns. Among the better points of their charter were the following:—1. That the district calculated for the growth of the export wines should be marked out, and the mixture of these wines with others from without the boundary prohibited. 2. That no one should be permitted to cover the vines with litter; as that operation, though it considerably augmented the produce, tended to deteriorate the quality of the wine. 3. That, in the manufacture of the wine, no one should use elder-berries; which not only gave it a false and evanescent colour, but also changed its natural flavour (the planting of the elder being at the same time forbidden within the line of demarcation, and orders given to extirpate the plants that already existed). 4. That, after each vintage, a list should be made out of the number of pipes in every cellar within the district; and that the wine-tasters of the Company, and others to be nominated by the farmers, should prove them, and arrange them in classes, distinguishing such as were fit for exportation, and delivering to the proprietors a corresponding ticket."

These were the more favourable points connected with the Company's privileges; but the unfavourable ones came into play gradually, and wrought great mischief in many ways. The powers were intended to guard the quality and fitness of the Douro wines generally; but the Company continued to interpret these powers to their own advantage, despite the injurious effect which resulted in other quarters. One of the evils is thus commented on by Dr. Henderson:—"It must be evident to every one possessed of common understanding, that no greater absurdity could have been imagined, than to mark out a district of several leagues in extent, exhibiting a great variety of soils and exposures, as the only territory capable of producing wines for exportation; especially when it was known that many of the growths within the line of demarcation were of inferior quality, while others without that boundary were of first-rate excellence. One obvious effect of this senseless enactment has been to encourage smuggling on the borders; for those farmers whose lands produce only light wines must naturally be tempted to improve them, and render them fit for purchase, by an admixture with the common ramo wines, which they can always procure at a low price, and import without much risk of detection." The Company also possessed the power of fixing a *maximum* price for the wines of the district; a power which thus

affected the agriculturist:—"If on favourable soils, and in propitious seasons, any superior wines were produced, it did not accord with the views of the Company, that these wines should be sent to its customers in their original purity; as it was more advantageous to conceal the existence of them, and to use them for mixing with the inferior sorts. The cultivator, therefore, of such fortunate growths, not being remunerated for his greater outlay, or for the superior skill and industry which he might have displayed in the management of his vineyard, could have no inducement to continue his exertions, but would thenceforth content himself with raising at the least possible expense, the greatest possible quantity of a middling quality, or such as he could most readily dispose of under the name of export wines."

The other kinds of Portuguese wine, such as that of Lisbon, known by that name, and Bucellas, produced a few miles from Lisbon, are of comparatively small sale and importance; but the wine of *Madeira*, which may be regarded as a part of Portugal, has a few peculiarities about it worthy of notice.

The vine was cultivated in Madeira with a view to vintage four centuries ago; but till the latter end of the seventeenth century its wine was not much known out of the island. In 1689 a writer describes the hills as being covered with vines, from which wine was made, and that this wine was brought to the towns in hog-skins upon asses' backs. At the present day numerous varieties of grapes are grown on the island, some of which will bear for sixty years. The vines are planted in lines in the vineyards in front of the houses, upon trellis-work seven feet high; the branches are conducted over the tops, so as to be exposed horizontally to the sun's action; thus affording a canopy to those who walk under them, and yielding a shade very acceptable in a hot climate. On the north side of the island the vines are trained up chestnut trees, to shelter them from the violence of the wind. Some of these vines are grown on elevations nearly three thousand feet high, and wine is made at an elevation of two thousand.

The mode of making the wine is usually this. For the best qualities, the fruit is gathered at different times, and carefully picked; the unripe and damaged portion being set apart for the manufacture of an inferior wine. The operation of treading is performed in a trough formed of strong planks, or excavated in a lava rock, and the juice thus obtained is called *vinho da flor*. The bruised grapes are then placed within the coils of a thick rope, made of the twisted shoots of the vine, and subjected to the action of the press, which gives the second quality of must. This is usually mixed with the former, and the whole is fermented in casks containing one pipe each. A few pounds of baked gypsum are thrown in, as soon as the fermentation commences; and while it lasts, the liquor is stirred once a day with a large flat stick, in order to accelerate the process. On account of the mountainous nature of the country, the grapes are sometimes pressed in one place and fermented in another, to which they are conveyed on men's backs either in goat-skins or in small barrels. The fruit is ripe by the first week in September; and by the second week of November the vine is expected to be clear.

The meaning of the names "East India" and "West India" Madeira, will be gathered from the following remarks by Mr. Redding:—"Madeira wine must attain age on the island, if it be not sent a voyage to a warmer climate, to gain its utmost excellence through a perfect decomposition of the saccharine principle. The expense of a voyage to the East Indies for this purpose is superfluous, as motion and heat will do it in any climate, and complete the decomposition of the principle which tends to fermentation. A pipe of Madeira has been attached to the beam of a steam engine in the engine-house, where the temperature is always high and the motion continual, and in a year it could not be known from the choicest East India."

Malmsey is a very rich kind of wine made in Madeira, and is produced from a grape which will only flourish in one small spot in the island

KING LOUIS-PHILIPPE'S VISIT TO ETON COLLEGE.

THE misconceptions of ourselves and our institutions, which are adopted occasionally by foreigners, and more especially by our nearest neighbours, the French, are occasionally of a most extraordinary character, and may lead to a cautious doubt as to whether our own knowledge of foreign countries may be so exact as we usually give ourselves credit for. Sometimes, of course, national prejudice on either side will so pervert the judgment as to lead to very opposite opinions; but how shall we account for such an instance as we are about to give?—in which almost every statement is utterly opposed to the truth, though there is no conceivable motive for misrepresentation, and the facts would have served the writer's purpose as well, or better than the fiction; and could not have been difficult to attain, even in France.

In 'La Presse' of the 15th of October, 1844, it is stated, in giving an account of the king's visit to Windsor:

"After the ceremony of the investiture, the King of the French received the corporation of the city of London, who presented their address to his Majesty. Then the king went to visit the college of Eaton [Eton], as he had promised. This college, one of the most ancient in England, and a *dependence of the University of Oxford*, is situated in the vicinity of Windsor. Built not far from the Thames, and on the old road which led from Windsor to London, its old walls are *seated half-way up the hill*, on the summit of which stand the slender turrets of Royal Residence. The visit was, therefore, only a short and agreeable walk for their Majesties and their attendants, for Eaton is contiguous to the park of the Castle.

"Their Majesties were received by the *Honourable Dean*, who did the honours of his college, celebrated among those of Great Britain, for the numerous and brilliant assemblage of youths who congregate thither to study, as well as for certain privileges and immunities which the pupils enjoy at the periods of the examinations. It is at the college of Eaton that almost all the young men who belong to opulent families of England are instructed. *It is also in this college that some of the sons of noble but poor families are gratuitously admitted.*

"In order to meet the expenses incurred for the maintenance of these indigent youths, a custom of a singular nature has been introduced. At certain periods all the scholars of the college *take a bag and go to the neighbouring highways* to beg of the passengers and travellers, who always answer the demands graciously and generously, and *thus supply the necessary means for the support of the college.* Every year, it is said, large sums are collected by this affecting (*touchante*) custom, *and new exhibitions* (*bourses*) *thus founded* for the advantage of those youths without fortune who bear honourable names.

"As to the privileges (*immunités*) of the scholars of the college of Eaton, they extend widely at the time of the examinations. Thus, for instance, at that happy period, *they may abandon themselves, in the city of London, to all the eccentric vagaries of youth, without any fear of the constable's forming an obstacle. They may break furniture and smash windows without the police interfering. If a police agent happens to come in the middle of this havoc* (*dégât*), *the Eaton scholar has but to show his card, and immediately the constable drops his staff respectfully, which he had raised to interpose between the rioters.*"

And this is given to the French people as serious and sober information. We have marked by Italic characters the more startling statements, beyond which we deem no attempt at correction necessary. The perverted account, however, of the custom of collecting "salt" at the Montem, and of the prostration of the London police before the Eton boys, is most excessively ridiculous.



[Cathedral of St. David]

THE CATHEDRAL OF ST. DAVID.

This Cathedral, we hardly need say, derives its name from the tutelary saint of Wales and Welshmen; but that is the least part of its connexion with the holy man, as we shall see by a brief notice of his life. He was the son of a Prince of Cardigan (whose name we need not transcribe, considering that it requires some seven words—and those Welsh ones—to do so), and was born about the middle of the fifth century. After a long period of study, first of general knowledge and literature, and secondly of divinity, he settled in a secluded place called the Valley of Roses, established a religious house, and brought around him a considerable number of scholars. The discipline he caused to be observed was unusually strict and severe. All were bound to labour with their own hands for the common welfare, all gifts or possessions offered by unjust men were to be refused, and a hatred of wealth was to be cherished. "They never conversed together by talking but when necessity required, but each performed the labour enjoined him, joining thereto prayer or holy meditations on divine things; and having finished their country work, they returned to their monastery, where they spent the remainder of the day till the evening in reading or writing. In the evening, at the sounding of a bell, they all left their work, and immediately repaired to the church, where they remained till the stars appeared, and then went altogether to their refection, eating sparingly and not to satiety. Their food was bread with roots or herbs seasoned with salt, and their thirst they quenched with a mixture of water and milk. Supper being ended, they continued about three hours in watching, prayers, and genuflections. As long as they were in the church it was not permitted to any to slumber, or sneeze, &c. After this they went to rest, and at cock-crowing they rose, and continued at prayer till day appeared. All their inward sensations and thoughts they discovered to their superior, and from him they demanded permission in all things. Their clothing was skins of beasts." ('Acta Sanctorum Martyrum.') Rapidly did the place, and still more so its founder, rise into repute. When the Pelagian heresy, as it was called, re-appeared in Wales, a Synod was called, about 519, to endeavour to check its progress. Moved by repeated entreaties, David at last consented to repair thither and personally engage in the undertaking; and, says Giraldus, "When all the fathers assembled enjoined St. David to preach, he commanded a child which attended him, and had lately been restored to life by him, to spread a napkin under his feet; and, standing upon it, he began to expound the Gospel and the law to the auditory. All the while that his oration continued, a snow-white dove, descending from heaven, sat upon his shoulders; and, moreover, the earth on which he stood raised itself under him till it became a hill, from whence his voice, like a trumpet, was clearly heard and understood by all, both near and far off." If any doubt the truth of these somewhat marvellous statements, let them go to the spot, and there to this day they will assuredly find a little hill, and a church (Llanddewi-Brefi) built upon it in commemoration of the event above mentioned. To return, however, to St. David: it appears the Assembly were so delighted with his eloquence and zeal in opposing the obnoxious doctrines, that they unanimously called upon him to accept the archbishopric of Caerleon, one of the three archiepiscopal seats (York and London being the others) into which England was then divided. David accepted the honours and duties, but on the condition of removing the see to Menevia, the establishment he had founded in the Valley of Roses. The period of these interesting events was the reign of that most interesting of sovereigns—King Arthur. Five and twenty archbishops in succession filled the archiepiscopal seat, and then the last of the number withdrew with all his clergy to Britanny, and after the lapse of some time the see became subject to Canterbury. Such was the origin and history of the present bishopric of St. David's.

The Cathedral stands near the sea-shore, amidst the wreck of various religious edifices, and in a city which itself is but a wreck of what it was, when pilgrims thronged from all parts of Britain to pay their respects to St. David's shrine, which is still preserved in the Cathedral, and exhibits four recesses for the receipt of offerings. Pope Calixtus ordained that two pilgrimages to this place should be reckoned equivalent to one to Rome. Among the monarchs who are known to have come hither may be mentioned the Conqueror, Henry II., and Edward I., and Eleanor. Giraldus relates a pleasant anecdote in connexion with the visit of the second Henry. Across the river Alan, which runs through the Cathedral precincts, there was in very an-

cient times a beautiful marble bridge, consisting of a single slab, measuring ten feet in length, by six in breadth and one in depth. "Henry II., on his return from Ireland, is said to have passed over this stone before he entered the church. Proceeding towards the shrine of St. David, habited like a pilgrim, and leaning on a staff, he met at the White Gate a procession of the canons, coming forth to receive him with due honour and reverence. As the procession moved along, a Welsh woman threw herself at the king's feet, and made a complaint against the bishop of the place, which was explained to the king by an interpreter; the woman, immediate attention not being paid to her petition, with violent gesticulations, and a loud and impertinent voice, exclaimed repeatedly, 'Vindicate us this day, Lechlavan! Revenge us and the nation in this man!' alluding to a vulgar fiction and proverb of Merlin, that a king of England and conqueror of Ireland should be wounded in that country by a man with a red hand, and die upon Lechlavan on his return through Menevia. The king, who had heard the prophecy, approaching the stone, stopped for a short time at the foot of it, and, looking earnestly at it, boldly passed over; then turning round and looking towards the stone, thus indignantly inveighed against the prophet: 'Who will hereafter give credit to the lying Merlin?' One of the bystanders then called out in a loud voice, 'Thou art not that king by whom Ireland is to be conquered, or of whom Merlin prophesied!'"

The Cathedral, which was erected by Peter, the forty-ninth bishop, is partly in the Norman, partly in the pointed style, three hundred and seven feet long, with a lofty square tower at the west end, and a lofty choir. The bishop's throne is of exquisite workmanship, and the rood-loft screen and roof are greatly admired. Giraldus Cambrensis, from whose writings we have borrowed the preceding anecdotes, lies buried here, obtaining in death that position among the bishops of the see which he failed to obtain in his lifetime; but to which his virtues and the twice recorded suffrages of the Chapter of St. David's so well entitled him.

THE SHERRY DISTRICT OF SPAIN.

SHERRY is so much the most important of the wines made in Spain, that the wine-trade of that country has relation almost wholly to this variety. We will avail ourselves of the description of Mr. Busby and other travellers, to give a short notice of the chief characteristics which mark this notable branch of Spanish industry and commerce—one of the very few that maintain their importance in that ill-regulated country.

The name of *Sherry* is derived from *Xeres*, a town in the centre of the wine-district. This is a small town near Gibraltar, but deemed one of the richest in Spain in relation to its population, owing to the vast trade there carried on in wine. A few years ago, when Mr. Busby wrote, there was a Scotch firm at Xeres who dealt largely in wine, and whose cellars at that place were enormous, the extreme length of the largest being more than three hundred feet, and the breadth two hundred. Their ordinary stock kept on hand was stated at four thousand butts, kept in casks of various sizes, holding from one to four butts each. Many other firms possess ranges of wine-cellars nearly or quite as large; and indeed the cellars constitute the principal buildings in Xeres.

One of the sherry vineyards visited by Mr. Busby contained about forty acres, producing from sixty to seventy butts of wine annually. The soil was of the description called in Spain *albariza*, consisting mainly of carbonate of lime, and which was said by the cultivators to be the best kind for the sherry grape. The distance of the plants apart was about five feet each way. Some of the vines were very old, and appeared to be in bad condition. Others, which were only six years old, were very vigorous; and as the grapes had not been gathered from a part of them, the branches were found to average eight or nine on each; the whole fruit of each plant averaging fourteen or sixteen pounds. In forming the young vines, as well as in pruning them afterwards, attention is generally directed to have the branches in such a direction that they will balance each other upon the stock, the latter being from twelve to eighteen inches from the ground before they spring out.

The mode of culture involves the following points:—Immediately that the grapes are plucked from one vintage, a small pit is dug around each separate plant, to enable the rain to penetrate to the roots. In January the whole plant is pruned; and the pits are then closed, in order that the moisture which has been received may be retained. The soil is soon afterwards loosened and freed from grass and weeds, which is generally effected by the middle of March. The soil is carefully smoothed twice, with an interval of three weeks; the vicious sprouts are cut off at the roots of the plants; the soil is pulverized very finely, and stakes are driven in to support the coming crop. In the meantime there are numberless minor points requiring the attention of the husbandman, especially the search for insects; so that the demand on his care and labour are unceasing. But, on the other hand, the vintage is less uncertain than in some other countries; so that although the cultivator works hard, he feels pretty sure of an adequate return for his exertions.

The grapes are allowed to hang till perfectly ripe, which generally occurs rather before the middle of September. After the plucking, those growers who are most attentive to their wines, place their grapes in baskets, and expose them to the sun for forty-eight hours, turning and sorting them all the while. When the wine is to be made, the grapes are carried to the pressing-room. The presses generally used in Spain are simply large wooden troughs, about eight feet square by twelve or fourteen inches deep; and each will contain, at one time, as many grapes as will yield a butt of wine. A coarse wooden screw stands in the centre of the trough, and is worked by a lever. A large quantity of grapes being heaped up in one part of the trough, the labourers commence by strewing upon them as much powdered gypsum as a man can take up with both hands. Some of the grapes are then spread over the bottom of the remainder of the trough, upon which the men jump with great violence, having heavy wooden shoes on their feet. After the greater part of the grapes are pretty well broken, they are piled up round the screw; and a flat band, made of a kind of grass, is wound round the pile, commencing at the bottom: the broken grapes being heaped and pressed in as the band is wrapped higher and higher, till they are all compressed into it. The men then commence working the screw, and the must or juice flows in great abundance. The bottom of each trough is elevated two or three feet above the floor of the cellar, with two or three spouts so arranged as to allow the must to fall into vessels beneath. The must is poured into butts; and the skins and husks, after having had water added to them, are again pressed, to yield an inferior quality of must.

The subsequent processes of fermentation, &c. are pretty nearly analogous to those observable in other wine-countries; but there is a difference between the kinds of sherry, which depends in a peculiar degree on the subsequent management of the fermented must. The difference between *light* sherry and *brown* sherry is stated by Mr. Inglis to be brought about in the following way:—If a butt of brown sherry be wanted,

a butt of light sherry is boiled down to one-fifth part of its bulk, till it acquire a deep brown colour; and one-half of this quantity is added to a butt of the best pale sherry, of course removing from this latter as much as will make room for the boiled wine. The wine here called 'light' sherry is not an inferior quality; it is the produce of the Xeres grape, planted upon a lighter soil near the mouth of the Guadelquiver, and produces a wine of rather lighter tint than that of other parts of the same district. This addition of the concentrated light sherry to the brown sherry does not render the latter more expensive; because the former is produced from a more abundant and cheaper grape than the latter. By adding more or less of this boiled wine to other sherries, any desired tint may be given to them; and all the gradations of colour, which are by many supposed to have connexion with particular growths or vintages of sherry, depend mostly if not entirely on the quantity of boiled wine mixed with the unboiled.

The casks in which the wine is stored in the cellars at Xeres are arranged in regular rows, in some parts of the cellar to the height of four tiers. They are called *soleras*, and always remain in the cellars: they contain wine of all ages, from one year to half a century.

The wine-merchants of Xeres never exhaust their stock of finest and oldest wine. According to the price at which wine expedited to the market is intended to be sold, it contains a larger or smaller proportion of old wine; but it is only in wines of a very high price, that even a small portion of their finest wines is mixed. What is withdrawn from the oldest and finest casks is made up from the casks which approach them nearest in age and quality, and these are again replenished from the next in quality to them. Thus a cask of wine, said to be fifty years old, may contain a portion of the vintages of thirty or forty seasons. The principal wine-merchants of Xeres do not ship wine for England (the best, or nearly the best of their customers) till it has attained the age of two years; that is, till the bulk of the wine has attained that age: but the differences in quality and price are made up chiefly by the greater or less quantity of the choice wine mixed with it. The higher qualities of sherry are those of which the bulk is four or five years old, and which is also mixed with some of the choice *vino*. Thus, every kind of sherry which reaches this country is a mixture of many different vintages: it may have been, perhaps, "seven years in bottle;" but before being bottled, and before leaving Spain, it was compounded from different sources.

The lowest-priced sherries are often brought from Malaga, which produces a wine, not, in fact, sherry at all; but they are sent to Xeres, and there "doctored" so as to pass for the wine of that district. All such wines have brandy added to them, to increase the strength. There is even a still further system of compounding different liquors together to make up the saleable sherry; for there is a very dry kind of sherry, called *mantillado*, or *amontillado*, which has a very light colour, and which is used to reduce the colour of sherries when too high; in the same manner as boiled wine is used to heighten the colour when too pale. The montillado is made sometimes accidentally and at other times designedly: if it be intended to produce montillado, the fruit is plucked a fortnight sooner than for sherry; but so uncertain are the results of a vintage, that if a hundred butts of wine be procured from a Xeres vineyard, and treated in precisely the same way, several of them will, in all probability, turn out to be Montillado, without the grower or the merchant being able to assign any reason for it.

Mr. Inglis says that—"Sherries, when adulterated, are not usually adulterated by the London wine-merchant, with the exception of those extremely inferior wines, which, from their excessive low price, no one can expect to be genuine wines, and which are probably mixed with Cape. But the class of wines which pass under the denomination of "low-priced sherries" are not adulterated at London, but at Xeres, by the grower, not by the exporter. These wines are mixed with the wines of Mogner, and with a larger proportion of brandy: and the exporter, in purchasing them from the grower, is quite well aware of their quality: but, being ordered to send a large cargo of low-priced wines, he is forced to purchase and export these. It may be laid down as a fact, that genuine sherry, one year old, cannot be imported under thirty shillings per dozen; and if to this be added the profit of the merchant and the accumulation of interest upon capital in older wine, it is obvious that genuine sherry, four years old, cannot be purchased in England under forty-five shillings." The same writer observes, while referring to the artificial manner in which *colour* is imparted to the darker sherries, and to the doubtful quality of most of that which reaches England:—"Before visiting Xeres, we cannot have any idea of the variety in flavour, and the various gradations of excellence in sherry; and, after tasting the primest samples of each kind, from the palest straw up to the deep brown, it is impossible to say which is the finest. I need scarcely repeat again, that it is entirely by the aroma and by the taste—not at all by the colour, that sherries are to be judged. The *wide* differences in colour depend entirely upon the proportion of boiled wine; while those slighter shades, perceptible among the pale and light golden wines, are owing to some small difference in the ripeness of the fruit."

Around the town of Malaga is a district which contains many vineyards, some for the preparation of wine, but the majority for the preparation of the well known raisins, or dried fruit. The Malaga wine is chiefly a dry wine, something similar to sherry, but much inferior in flavour, and sold chiefly to the Americans. It is a sweet-tasted wine, and having no great alcoholic strength it has been used in America more extensively since the use of ardent spirits has lessened. The vine-growers in the neighbourhood of the town do not, like those of Xeres, hold their wine twelve months before selling it to the merchants. They have earthen vats of the shape of an oven, and sometimes large enough to contain two or three butts. Into these vats the *must* flows as the grapes are pressed; and as they become filled, the wine, in order to make room for more, is conveyed from them, more or less fermented according to circumstances, to the stores of the merchant. Their means of conveyance are mules and asses; the wine being carried in sheep-skins, which, from being constantly used, do not impart any unpleasant taste to the wine. Mr. Busby states that "A great portion of the wines exported to England under the name of sherry are the growth of Malaga, and are brought round and transhipped at Cadiz. Most of the sherries sold by retail in England, under forty shillings per dozen, are either of this kind, or of the commonest qualities of the San Lucas and Port St. Mary's vineyards."

Luther's Convent.—We breakfasted this morning at Erfurt, and made duteous pilgrimage to the Augustine Convent, which Luther inhabited as a monk. In the church he said his first mass; and it remains in the same state, with a rude old pulpit in which Luther preached, and carved wooden galleries. His cell is preserved as when he lived in it. It is like conventual cells all over the world, a small square high chamber. Here is the Bible that he first found in the library of the convent; and studying with his powerful mind, began to perceive the errors of the church to which he belonged. The convent is now used as an orphan-house.—*Mrs. Shelley's Rambles.*



[Portrait of Raphael, with the Marriage of Joseph and Mary.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXXI.

RAPHAEL SANZIO D'URBINO: b. 1483; d. 1520.

WE have mentioned two among the great men who influenced the progress of art in the beginning of the sixteenth century—Lionardo dā Vinci and Michael Angelo. The third and greatest name was that of RAPHAEL.

In speaking of this wonderful man we shall be more diffuse and enter more into detail than usual. How can we treat in a small compass of him whose fame has filled the universe? In the history of Italian art he stands alone, like Shakspere in the history of our literature, and he takes the same kind of rank, a superiority not merely of degree, but of quality. Everybody has heard of RAPHAEL, every one has attached some associations of excellence and beauty, more or less defined, to that familiar name: but it is necessary to have studied profoundly the history of art and to have an intimate acquaintance with the productions of contemporary and succeeding artists, to form any just idea of the wide and lasting influence exercised by this harmonious and powerful genius. His works have been an inexhaustible storehouse of ideas to painters and to poets. Everywhere in art we find his traces. Everywhere we recognise his forms and lines, borrowed or stolen, reproduced, varied, imitated, never improved. Some critic once said, "Show me any sentiment or feeling in any poet, ancient or modern, and I will show you the same thing either as well or better expressed in Shakspere;" in the same manner one might say, "Show me in any painter, ancient or modern, any especial beauty of form, expression, or sentiment, and in some picture, drawing, or print after Raphael, I will show you the same thing as well or better done, and *that*

accomplished which others have only sought or attempted." To complete our idea of this rare union of greatness and versatility as an artist with all that could grace and dignify the man, we must add such personal qualities as very seldom meet in the same individual—a bright, generous, genial, gentle spirit; the most attractive manners, the most winning modesty—

> "His heavenly face the mirror of his mind;
> His mind a temple for all lovely things
> To flock to, and inhabit;"—

and we shall have a picture in our fancy more resembling that of an antique divinity, a young Apollo, than a real human being. There was a vulgar idea at one time prevalent that Raphael was a man of vicious and dissipated habits, and even died a victim to his excesses; this slander has been silenced for ever by indisputable evidence to the contrary, and now we may reflect with pleasure that nothing rests on surer evidence than the admirable qualities of Raphael; that no earthly renown was ever so unsullied by reproach, so justified by merit, so confirmed by concurrent opinion, so established by time. The short life of Raphael was one of incessant and persevering study: he spent one-half of it in acquiring that practical knowledge, that mechanical dexterity of hand, which were necessary before he could embody in forms and colours the rich creations of his wonderful mind; and when he died at the age of thirty-seven, he left behind him 287 pictures and 576 drawings and studies. If we reflect for one moment we must be convinced that such a man *could* not have been idle and dissipated: for we must always take into consideration that an excelling painter must be not only a poet in mind, but a ready and perfect artificer; that nature may bestow the "genius and the faculty divine," but only time, practice, assiduous industry, can give the exact and cunning hand. "An author," as Richardson observes, "must *think*, but it is no matter what character he writes; he has no care about that, if what he writes be legible. A curious mechanic's hand must be exquisite; but his thoughts may be at liberty." The painter must think and invent with his fancy, and what his fancy invents his hand must acquire the power to execute, or vain is his power of creative thought. It has been observed—though Raphael was unhappily an exception—that painters are generally long lived and healthy, and that, of all the professors of science and art, they are the least liable to alienation of mind or morbid effects of the brain. One reason may be, that through the union of the opposite faculties of the excursive fancy and mechanic skill, —head and hand balancing each other—a sort of harmony in their alternate or coefficient exercise is preserved habitually, which reacts on the whole moral and physical being. As Raphael carried to the highest perfection the union of those faculties of head and hand which constitute the complete artist, so this harmony pervaded his whole being, and nothing deformed or discordant could enter there. In all the portraits which exist of him, from infancy to manhood, there is a divine sweetness and repose; the little cherub face of three years old is not more serene and angelic than the same features at thirty. The child whom father and mother, tutor and stepmother, caressed and idolized in his loving innocence, was the same being whom we see in the prime of manhood subduing and reigning over all hearts, so that, to borrow the words of a contemporary, "not only all men, but the very brutes loved him:" the only very distinguished man of whom we read, who lived and died without an enemy or a detractor!

Raphael Sanzio or Santi was born in the city of Urbino, on Good Friday in the year 1483. His father, Giovanni Santi, was a painter of no mean talent, who held a respectable rank in his native city and was much esteemed by the Dukes Frederigo and Guidobaldo of Urbino, both of whom played a very important part in the history of Italy between 1474 and 1494. The name of Raphael's mother was Magia, and the house in which he was born is still standing, and regarded by the citizens of Urbino with just veneration. He was only eight years old when he lost his mother, but his father's second wife, Bernardina, well supplied her place, and loved him and tended him as if he had been her own son. His father was his first instructor, and very soon the young pupil was not only able to assist him in his works, but showed such extraordinary talent that Giovanni deemed it right to give him the advantage of better teaching than his own. Perugino was the most celebrated master of that time, and Giovanni travelled to Perugia to make arrangements for placing Raphael under his care, but before these arrangements were completed this good father died, in August, 1494. His wishes were however carried into execution by his widow and by his wife's brother, Simone Ciarla, and Raphael was sent to study under Perugino, in 1495, being then twelve years old.

He remained in this school till he was nearly twenty, and was chiefly employed in assisting his master. A few pictures painted between his sixteenth and twentieth year have been authenticated by careful research, and are very interesting from being essentially characteristic. There is, of course, the manner of his master Perugino, but mingled with some of those qualities which were particularly his own, and which his after life developed into excellence; and nothing in these early pictures is so remarkable as the gradual improvement of his style and his young predilection for his favourite subject, the Madonna and Child. The most celebrated of all his pictures painted in the school of Perugino was one representing the Marriage of the Virgin Mary to Joseph:—a subject which is very common in Italian art, and called 'Lo Sposalizio' ('the Espousals'). This beautiful picture is preserved in the Gallery at Milan. There is a large and fine engraving of it by Longhi, which can be seen in any good print-shop. In the same year that he painted this picture (1504), Raphael visited Florence for the first time. He carried with him a letter of recommendation from Giovanna, Duchess of Sora and sister of the Duke of Urbino, to Soderini, who had succeeded the exiled Medici in the government of Florence. In this letter the duchess styles him "a discreet and amiable youth," to whom she was attached for his father's sake and for his own good qualities, and she requests that Soderini will favour and aid him in his pursuits. Raphael did not remain long at Florence in this first visit, but he made the acquaintance of Fra Bartolomeo and Ridolfo Ghirlandajo, and saw some cartoons by Lionardo da Vinci and Michael Angelo, which filled his mind with new and bold ideas both of form and composition. In the following year he was employed in executing several large pictures for various churches at Perugia. One of these, a large altar-piece, painted for the church of the Servite, is now at Blenheim; it is full of beauty and dignity; beneath it was a little picture of St. John preaching in the Wilderness, which is in the possession of Lord Lansdowne. About the same time he painted for himself a lovely little miniature called "the Dream of the Young Knight," in which he represents a youth armed, who sees in a vision two female figures, one alluring him to pleasure, the other, with a book and sword, inviting him to study and to strive for excellence. This is now in England, in the possession of Lady Sykes.

When he had finished these and other works he returned to Florence, and remained there till 1508. Some of the most exquisite of his works may be re-

ferred to this period of his life, that is, before he was five and twenty.

One of these is the Madonna sitting under the Palm-tree, while Joseph presents flowers to the Infant Christ. This may be seen in the Bridgewater Gallery. A second is the Madonna in the possession of Earl Cowper, and now at Panshanger. Another is the famous Madonna in the Florentine Gallery, called the 'Madonna del Cardellino' (the Virgin of the Goldfinch) because the little St. John is presenting a goldfinch to the Infant Christ. Another, as famous, now in the Louvre, called 'La Belle Jardinière,' because the Madonna is seated in a garden amid flowers, with Christ standing at her knee. The St. Catherine in our National Gallery was also painted about the same period, and the little picture of St. George and the Dragon, which Guidobaldo, Duke of Urbino, sent as a present to Henry VII., and which is now at St. Petersburg. In this picture St. George is armed with a lance, and has the Garter round his knee, with the inscription "Honi soit qui mal y pense." There is another little St. George in the Louvre, in which the saint is about to slay the dragon with a sword. And there are besides two or three large altar-pieces and some beautiful portraits, in all about thirty pictures painted during the three years he spent at Florence.

SAUSSURE AND HIS SUCCESSORS.

In a former Number (747) we gave a few details respecting the residence of M. Agassiz among the Alpine glaciers. Since then Professor Forbes has published a very full account of his researches in the same region, further illustrating the curious mode of life, and the "ban breadth 'scapes" to which such explorers are exposed. When we find a mere tourist, from motives of curiosity, plunging himself into all sorts of dangers which he might easily avoid, we may marvel without admiring; but when a man of science leaves his books and his lecture-room, and wanders away with the express purpose of solving some important scientific question, and does the same thing year after year, we can hardly fail to recognise one of the best motives which can influence a traveller, and to admire the spirit which conducts him through his self-imposed task. The Alpine glaciers have witnessed many such enterprises within the last few years. Agassiz, Forbes, Hugi, and other men of science have visited these spots with the purpose of detecting the causes which regulate the phenomena of glaciers.

Saussure was one of the first to display this ardour in the pursuit of science. Indeed, later travellers on the Alps have only carried out the bold method of exploration which he adopted; and we must, to appreciate what he did, bear in mind the knowledge possessed at that time respecting glaciers.

It is perhaps by this time pretty generally known, that a glacier is a vast mass of ice occupying a valley between two mountains, or inclining against the slope of a mountain, and is of vast thickness; but all beyond this has been matter for laborious investigation. Does the glacier seem like solid ice, as if a lake had been frozen; or does it more resemble frozen snow? Does it slide downwards; and, if so, is this movement continuous or periodical? Does it increase or diminish in size year by year? What are the causes of a veined structure observable in the ice; of fissures observing a certain general direction; of a convexity in the middle of the mass; of long rows of blocks of stone and rock observable on the surface; of isolated blocks perched up in pyramids of ice?—these are some of the questions which are now undergoing examination, and which Saussure was the first to investigate by the bold plan of going to live for many days on the ice itself.

Mr. Forbes speaks in the highest terms of the qualifications which Saussure brought to bear on this task. He says:—"The writings of De Saussure have been the subject of perpetual reference—not only at home, but among the very scenes which he has described, and where it is easy to retrace the exactness of his assertions, and the faithful yet sober colouring of his descriptions. Himself a man of independence and station at Geneva, early imbued with a taste for exploring mountain scenery; well instructed in the then existing state of natural history and the allied branches of physics—he was exactly in the proper position for advancing a knowledge of his own country, and of those natural laws which may best be studied amongst its mountains. His journeys were not '*tours de force*,' miracles of rapidity and boldness, from which, if anything were gained, it must have been by a sort of intuition. On the contrary, even his more adventurous expeditions were commenced with a calm foresight, peculiar to himself, of the ends to be gained, and the best methods of attaining them. He did not court dangers; he did not affect to despise even inconveniences. His fortune permitted him to travel and observe in a manner which is as rare at the present day as formerly. He was frequently accompanied by ten or twelve men, and four or six mules carrying baggage, provisions, instruments, beds, and a tent; and perhaps to this precaution may be partly attributed the long period of life through which he was able to extend his laborious researches, trying to most constitutions, and from which he states that even he did not fail to suffer at last."

As early as 1760, Saussure announced publicly to the guides living at Chamouni, near Mont Blanc, that he would give a considerable sum to who would find a practicable route to the summit of the mountain. Two attempts were made at the time, both failed. Fifteen years afterwards, four guides made the attempt together, but gave it up in despair after making great exertions. In 1783 three guides tried, but were conquered; as was M. Bourrit and some guides who next made the attempt.

At length, in 1786, Saussure resolved to make the attempt himself. As it was necessary to arrange for sleeping one night high up on the mountain, two men were despatched previously, to build a temporary hut of dry stones. A party, consisting of seventeen persons, set out, and ascended gradually, now passing along the edge of a ravine, now crossing a glacier, now meeting with a rugged stony ridge. After five or six hours' walking they reached their hut, which was four thousand feet above the inn from whence they set out. Saussure then adjusted his instruments, and made all possible observations on temperature, moisture, electrical state, &c., of the air. Their little hut measured eight feet by seven, and was four feet high, formed of stones piled rudely one on another; a little aperture served them for an entrance, and an open umbrella served as a door to that entrance. Saussure lay on his bed, and looked out upon the moonlight reflected from the snow and rocks; but soon fell into a sound sleep.

At six o'clock the next morning they resumed their journey. They knew that they had yet to ascend four thousand feet on rocks, and two thousand on snow, before they could reach the summit; and they prepared themselves accordingly. The farther they went, the steeper the ascent became. On one ridge not only was this steepness very great, but the rock of which it was formed rolled into fragments beneath their feet. "Sometimes," says Saussure, "pieces came away in our hands when we laid hold of them; often, not knowing where to lay hold, I was obliged to catch at the leg of the guide next before me. The ascent in some places was so steep that sometimes his leg was level with my

head." At length, after three hours' continued ascent up this awful ridge, the steepness became so great, and the coating of snow so thick, that the party were compelled, much against their own inclination, to give up the exploit as hopeless. They had reached a height of eleven thousand feet, and consoled themselves with the reflection that, although they had not fully succeeded, they had yet attained a greater height than any previous explorers in any part of Europe.

In the following year Jacques Balmat, one of the guides, found a way of reaching the summit of this celebrated mountain; and in 1787 Saussure again prepared for the attempt. After a toilsome ascent to a great height, his party slept in a bed of snow, greatly distressed by the rarefied state of the air at that great altitude. The following is a picture of one part of the subsequent ascent.—"The declivity became continually more sloping, and on our left bordered by a frightful precipice, it was necessary to get over a pretty large opening, the passage of which was incommoded by a rock of ice, which forced us to the border of the declivity. The foremost guides had cut steps here and there on the hard snow as they went on; but as they had left the spaces too long, it was necessary to take such long steps that we ran the risk of missing one's footing, and sliding without remedy to the bottom. At last, towards the top, the thawed surface became thinner; then it broke under our feet, and underneath it eight or nine inches of crumbled snow, which rested on a second crust of hard snow, into which we sank to the calves of our legs; after which we slid down the side of the precipice, to which we were only held by the upper crust of snow. If this crust, thus loaded with the greatest part of our weight, had broken, we should infallibly have slid to the bottom. I did not think of the danger; my resolution was taken: I was determined to go on as long as my strength would enable me, and I had no other thought than that of advancing with a firm step."

In passing along dangerous spots, Saussure adopted the following plan. He had a light but strong stick, eight or ten feet long; and this was held horizontally by two guides, one at each end, and one behind the other, so that it formed a kind of railing or barrier whenever they were traversing a precipice. Saussure walked between the two guides, and held by the middle of this stick.

The last part of the ascent was the most painful of all. The rarity of the air at that elevation was so great as to take away almost every power of exertion. He was obliged to stop every sixteen or twenty steps to take breath: his legs failed him, his head became dizzy, and his temper seems to have been affected by his state of physical exhaustion. The remark he makes as to his first sensation when he reached the summit is characteristic of the motives which from the first had prompted him. He says, "The moment I had got to the highest point of the snow with which this summit is crowned, I trod upon it with a sort of vexation rather than with a sentiment of pleasure; for my object was not solely the getting to the top; I wanted there to make observations and experiments which would render this undertaking valuable; and I was very much afraid I could make but a very small part of what I had proposed; for I had already found, even on the platform where we slept, that all experiments requiring care caused fatigue in this rarefied air, because the breath must be held in making careful observations—a thing that can hardly be done where the difficulty of respiration is so great."

In these attempts, both unsuccessful and successful, to ascend Mont Blanc, Saussure had in view the collection of any and every detail which could illustrate the geology and natural history of the Alps; but in one very remarkable enterprise he astonished every one by the bold energy with which he pursued his scientific object. He passed seventeen days on the pinnacle of a lofty mountain, or in a little temporary hut just below the pinnacle, making observations with various instruments, and instilling into his hardy guides a bold determination which even to them was new. This spot was called the Col de Géant; it is eleven thousand feet above the level of the sea. Saussure, his son, and several guides and porters, toiled up to this spot in July, 1788, there they built a cabin six feet square, accompanied by two tents, which was just visible to the peasantry in the plains of Piedmont below. The almost astonishment was felt by the peasants at such a seeming causeless exposure to cold and danger; and there were not wanting rumours that sorcery must be at work aloft in the mountain. Saussure pursued his object steadily. He made observations on the few plants and animals found in that region; he observed the nature and superposition of the rocks; the prevailing direction of the wind; the varying height of the barometer; the range of temperature, and the relation between it and the height of the station; the solar radiation, the temperature of the interior of masses of snow; the electricity of the atmosphere; the moisture of the air; the colour of the sky; the magnetism of the earth,—and in short there was scarcely a department of science which he did not enrich with valuable observations of some kind or other: and this, too, at a spot where personal discomforts surrounded him on all sides. His guides became thoroughly wearied and exhausted; and it required some address to keep them firm to his service.

BILLINGSGATE MARKET.

If the stranger visits Billingsgate in summer, many objects will engage his attention, but in a winter's morning the market alone. How solitary are the streets! and yet London is never entirely buried in sleep. At the most untimely hours the avocations of some classes of its busy population call upon them to be astir. The pause seems deepest from two to three o'clock. Riot, Profligacy, Want, and Misery have retired, and Labour is scarcely risen. As we approach Billingsgate the profound silence of the night is now and then broken by the wheels of the fishmonger's light cart, who is proceeding to the same destination. The whole area of the market, brilliantly lighted with streaming flames of gas, comes into view. One might fancy that the place was arranged for a feast of rude plenty. The tables of the salesmen, which are ranged from one side of the covered area to the other, afford ample space for clustering throngs of buyers around each. Each range appears to form one table, but the portion assigned to each salesman is nine feet by six. Each salesman sits with his back to another, and between them is a wooden board, so that they are apparently enclosed in a recess; but by this arrangement their pockets escape the pickpocket, which was not the case when they were not separated from the crowd. There are about sixty fish-salesmen in London, and probably fifty have stalls in this market, for which they pay a comparatively trifling rent. Proceeding to the bottom of the market, we perceive the masts of the fishing-boats rising out of the fog which casts its gloom upon the river. The boats lie considerably below the level of the market, and the descent is by several ladders to a floating wharf, which rises and falls with the tide, and is therefore always on the same level as the boats. About twenty are moored alongside each other. The oyster-boats are berthed by themselves. The buyer goes on board the latter to make his purchase, as oysters are not sold in the ordinary market-place. The fishermen and porters are busily engaged in ar-

ranging their cargoes for quick delivery as soon as the market commences. Two or three minutes before five the salesmen take their seats in their enclosed recesses. At the lower end of the market, nearest the boats, porters stand with baskets of fish on their heads. Not one of them is allowed to have the advantage over his fellows by an unfair start, or to overstep a line marked out by the clerk of the market. The instant the clock strikes the race commences, and each porter rushes at his utmost speed to the respective salesman to whom his burthen is consigned. The largest cod are brought in baskets which contain four; those somewhat smaller are brought in sixes; and smaller sizes in dozens, and in still larger numbers, but always in baskets. All fish are sold by the tale except salmon, which is sold by weight, and oysters and shell-fish by measure. The baskets are instantly emptied on the tables, and the porters hasten for a fresh supply. It is the fisherman's interest to bring his whole cargo into the market as soon as possible, for, if the quantity brought to market be large, prices will fall the more quickly, and, if they are high, buyers purchase less freely, and he may miss the sale. The following case has often been quoted:—In May, 1807, the first Brighton boat-load of mackerel sold at Billingsgate for forty guineas per hundred—seven shillings each, reckoning six score to a hundred; while the next boat-load produced but thirteen guineas per hundred. Another reason for dispatch is that supplies conveyed inland often arrive after the opening of the market; and for some kinds of fish especially, a sudden fluctuation in price may be occasioned by a van from Hastings or Dover, or some other part of the coast. So the porters keep up an incessant run between the boats and the salesmen's stalls until they have brought forth their whole stock. Some of the heaps of fish would enchant a Dutch painter. The soles, just taken from the well-boat, gasp in their last agony on the stall, and in the next moment are purchased and hurried off to the dealer's cart. The rich turbot, with its blushing fins, which in a few hours will be the cause of a thousand amenities, is treated with no more ceremony or respect than a maid or a plaice. It is chiefly the west-end fishmongers who buy up turbot, but in this market any person who chooses may buy just in the same way as the dealers themselves. All the sales are by Dutch auction, a mode which allows little time for either flourishing or disparaging phrases. The seller, according to this plan, puts up the commodity at his own price, choosing, one may be sure, a sum sufficiently high to begin with, and if he does not sell he soon mentions a lower sum. The buyer also offers his price, and if a bargain be closed, it is usually by meeting each other, *i. e.* the buyer advancing and the seller coming down in price. Other purchasers surround the stall—perhaps they think they may do better elsewhere, and move off to some other salesman, and by making the round of the market the range of prices is soon tolerably well ascertained. The buyers are as good judges as the salesmen. Price alone engrosses attention. This system ought to give those who witness its daily operation a good lesson or two in political economy. Here, in the open market, competition places the buyer and seller on equal terms. No combination exists to obstruct these advantages. Such an artificial basis would speedily be demolished in the bustle and animation which characterise the proceedings. The buyers shift rapidly from one salesman to another, demanding only one thing—price, and thus running about the market is striking to the eye, and interesting from its object, which is sure of being obtained. The money in the outstretched hand of one dealer, with a dozen other dealers around, quickly indicates to the salesman the price at which sales can be effected, and that it would be useless to stickle for higher ones. If the buyers were to give too high a price one day, their sales would fall off, they would buy less the next, and prices would fall. Simple as is the mode of sale, it does not follow that judgment and skill, and a ready wit, are not needed. The salesman who possesses these qualities in the highest degree will clear his stalls much more rapidly, and at the same time more advantageously, than one who possesses a smaller share of these gifts. There is not one of the markets of London which is so little exposed to the chances of collusion or any underhand conduct as that of Billingsgate. The proceedings of the retail dealers in their respective localities, where they are removed from the influences of the open market, may have nothing whatever to do with the principle on which it is certain the wholesale part of the trade is regulated. In one district the retail dealer gives long credit, often incurs losses, and he must therefore charge a high price. In another there may happen to be little competition, or, what is usually the same thing, a small demand, and price will here again be high, that is, comparing it with that which prevails at Billingsgate. The uncertainty of the price is probably one very powerful reason why fish is purchased so seldom by many housekeepers. They cannot tell the price beforehand, as for beef and mutton. But in these discussions we are forgetting our real object, which is to attempt to give the reader some idea of the market. Does the visitor expect to witness scenes of coarseness and brutality? Nothing of the kind will meet his eyes. Why should they? When the market opens, the majority of the persons present are either the dealers themselves or their trustworthy servants. Soon after six there is a greater mixture of classes. The hawkers come to make their purchases, and Billingsgate has something of the appearance which it had previously assumed in our imagination, but there is nothing to disgust either in language or behaviour. The manners of Billingsgate have improved, and yet the standard phrase for abuse either of the tongue or pen will probably never be altered, so that after-generations may forget that here once flourished that racy eloquence which was characterised by its warmth of style, its rude force, and coarse but telling points. Ned Ward in his 'London Spy,' published at the close of the seventeenth century, describes the vulgar humours of Billingsgate, and it is only necessary to read them to feel convinced how much the place is improved. Ward mentions a place called the Dark House (not a house for insane persons), the frequenters of which seem to have combined the peculiarities of Wapping and Billingsgate. The site on which it stood is now called Dark House Lane. One feature of Billingsgate has been destroyed by the introduction of steam-boats. Before they existed, passengers embarked here for Gravesend and other places on the river, and there was a great mixture of sailors with the dealers in fish, perhaps not much to the improvement of manners. The boats sailed only when the tide served, and the necessity of being ready at the most untimely hours rendered many taverns necessary for the accommodation of passengers. The opening of the market formerly at so early an hour as three o'clock was demoralizing and exhausting. Two hours are now gained, and the hours of rest are not unnaturally broken in upon. The refreshment now chiefly taken by persons who attend the market is coffee instead of spirits, and this circumstance alone has had a most favourable influence. The wholesale market is over about nine o'clock, and the only dealers who remain after that hour are a few retailers who have stalls, who are called in the market "bomarees," a word whose etymology we do not profess to have discovered. — *London.*



[Hunting the Ostrich.]

LOCOMOTION OF ANIMALS.—No. X.

Birds.—As birds are constituted for three kinds of locomotion, that is, in air, in water, and on dry land, it is obvious that they must have organs adapted for these several kinds of progression. Their arms, which form the wings, are not organized to be employed for prehension, as in man, or for moving on them in the manner of quadrupeds. Birds are essentially bipeds when moving on solid surfaces; and as the feet of birds are so constituted that the toes only reach the ground, they may be denominated *digitigrade bipeds*.

The head, neck, and body of the bird are poised upon its legs in such a manner that the head may be elevated or depressed without danger of its falling. Those portions of the body situated in front of the legs tend to depress the head towards the ground, and those situated behind the legs tend to raise the head in the opposite direction; the weight of these parts being equal, keeps the body balanced on the heads of the thigh bones, which are not only the points of support of the body, but likewise the axis of motion on which the body turns.

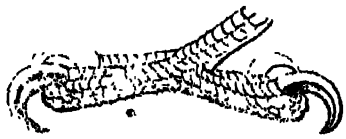
We observe in most birds which move entirely on the land, such as the turkey, pheasant, partridge, and numerous others, that the axis of the body is inclined to the horizon, the head being the most elevated portion of the whole animal. As a line passing through the heads of the thigh bones is the axis on which the body moves, and is supported, the centre of gravity of the body must pass through that axis, or the body of the animal would rotate on it. We know, by daily experience, that the beam of a weighing-machine is made to turn on a pivot; and that if unequal weights be attached at the extremities, as loaded scales, for instance, the arm will be depressed in the direction of the greatest weight, and the arm on the opposite side of the beam will be elevated; but if the weights be equal, the beam will remain stationary. Now the body of the bird is poised similarly to the beam and weights; and it is curious to observe the methods by which the equilibrium of the body on the legs is maintained.

The head of the bird, being placed at the extremity of the neck, which in many species is very long and mobile, acts as a weight placed at the end of a long lever, whose length is the distance of the head from the axis already mentioned, about which the body of the animal turns. Now, as the distance of the head is varied by every change in the direction of the neck, the mechanical effect is the same as the shortening or lengthening of one arm of the beam of a weighing-machine would produce; that is, the force increases in proportion to the increased length, and *vice versâ*. The vertebræ of birds are firmly joined together, and do not move on each other as they do in man and in quadrupeds, so that the animal cannot twist and turn its body on itself to adjust the trunk on its legs, and it is only at the extremities of the trunk that the parts are moveable. The tail when spread out like a fan furnishes a large surface to strike the air, and in this manner its action is important to some birds when walking; as is very conspicuous in the moorhen and others. The head, neck, and tail, then, are the parts employed in keeping the trunk of the bird poised on its legs in such a manner that it can stand very steadily, and walk and run without falling; thus we observe that, whilst the animal moves, the head, neck, and tail are in constant motion. The length of the legs varies considerably in different kinds of birds, and controls the velocity of their movements very sensibly, as does also the mode in which the legs are employed. Cranes and herons whilst walking swing one leg partly round the other; that is, one leg in swinging describes a portion of a circle around the other which is resting on the ground. The grallatores are furnished with long legs, which being destitute of feathers are well calculated for walking in water, and for making long strides in search of food. There are many other birds which move one leg at a time, whilst the other supports the body, the two legs interchanging their offices alternately, as in human progression. Thus, when the bird walks slowly, the body is supported during a short period by both legs, and during a longer period by one. But if the bird adopts a very rapid pace, the body is supported by one leg only at a time, as one leg rises the instant the other reaches the ground; but at no period of walking are both legs raised at the same moment from the ground, as that would constitute running or hopping.

Many birds, such as blackbirds, sparrows, the various kinds of finches, and others, do not move the legs alternately, but simultaneously, performing a succession of small leaps. This mode of progression is common to birds which are furnished with very short legs, a circumstance which would make the step excessively short if performed by moving the legs alternately in the ordinary manner. Even this method, however, does not enable them to advance with much celerity, and on the least alarm they adopt the more ready and effectual mode of escape by taking wing.

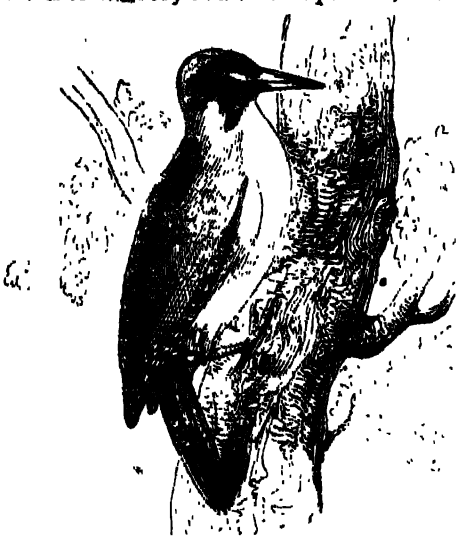
In the parrot, cuckoo, and woodpecker the internal

toes and thumb are turned backwards (*Fig.* 1), a structure which enables these birds to grasp objects in the



[Foot of Woodpecker, *Fig* 1.]

manner of a hand. By this means, also, they have the power of climbing trees with great facility, during which action the tail is frequently employed to aid in keeping the axis of the body in a vertical position, as in *Fig.* 2.



[Green Woodpecker, *Fig* 2.]

Some birds, such as the ostrich, emu, or cassowary, are not endowed with the power of flight, the weight of the body, compared with the size of the wings, being too great to enable them to sustain themselves in the air; but in walking and running they far surpass all other birds. Their legs are of enormous length, a construction which enables them to take steps of great magnitude with considerable rapidity. The ostrich runs with amazing speed, and can outstrip the fleetest Arabian horse. The following account is taken from the 'Menagerie of the Zoological Gardens:'—

"The chace of these birds is accounted one of the most skilful and difficult exercises, both for the Arab and his horse, requiring at once the most unwearied patience and the most reckless impetuosity. The former is absolutely necessary in order to keep them within sight, and to watch their motions as they wheel round in a circle of greater or less extent; and the latter, to seize the favourable opportunity of dashing down upon them in their course, and disabling them, which is generally effected by means of a stick thrown with dexterity between their legs. A chace of this kind will frequently last from eight to ten hours. M. Adanson, who had several times witnessed the spectacle in Senegal, declares that even when mounted by two men they outstripped in speed an excellent English horse. In running they always expand their wings."—By varying the inclination of their wings to the wind, they preserve the equilibrium of the body in flight, and are thus rendered much more secure from falling.

Next in size and speed to the ostrich are the cassowaries. Of those in New Holland, the speed exceeds that of the swiftest greyhound; and the length of their legs is very considerable.

In fast walking, the hinder leg, having been extended to its greatest length, is raised the instant the head of the thigh bone in the forward leg comes vertically over the foot, and the position of the two legs at the moment the hind leg is about to be raised is such that they form with the length of the step a right-angled triangle; so that the height of the head of the thigh bone from the ground and the length of the extended leg being given, the length of the step may be found. In very quick running the forward leg, which supports the body, is much bent, and the centre of gravity of the body brought nearer to the ground. This is necessary in order to accomplish the greatest length of step in the least portion of time; the time of each step is also diminished in running by the hind leg being raised before the forward one reaches the ground, so that the hind leg performs a portion of its arc of oscillation whilst the body moves through the air, unsupported by either leg, and the bird is thus alternately supported by one leg during a short period and left altogether unsupported by either leg during a longer period, as in man.*

As we find that the ostrich excels in speed the horse, and the cassowary the greyhound, which are reckoned among the swiftest of quadrupeds, we at once perceive that these birds do not require the aid of their wings to raise them in the air, in order to escape from their enemies; and if the intelligence of the ostrich were in proportion to its speed, the mounted Arab would never be able to overtake it in the chace, but as it directs its flight in a circular instead of a straight course, as in *Fig.* 3, at the head of the article, its pursuer takes advantage of its ignorance of one of the most simple geometrical facts, namely, that the nearest path between two distant points is a straight line. Hence it appears that though its safety absolutely depends on the knowledge of the course it should take in flight, it has never solved this important problem; and notwithstanding its greater bulk of brain, it is far inferior in point of sagacity to the diminutive bee, and many other insects which display considerable skill in the geometrical construction of their habitations, and are known (by careful observation) to take the shortest road in their flight from one place to another.

SAUSSURE AND HIS SUCCESSORS.

[Concluded from page 439.]

Saussure's researches in the Alps had relation to scientific observations generally; but recent enterprises have been connected more especially with the subject of glaciers. Professor Forbes has been one of the most active of these mountain ramblers; and we will shortly notice a few of the difficulties which attend such researches.

Mr. Forbes, in the course of a series of years, has crossed the principal chain of the Alps twenty-seven times, generally on foot, by twenty-three different passes; of which some, such as Great St. Bernard, Mont Cenis, the Simplon, St. Gothard, the Splügen, and the Stelvio, are now pretty well known, while many others are but little known. In most of these journeys he had only one or two guides; while in others he was accompanied by men of science having similar objects with his own.

One of Mr. Forbes's excursions was to the Mer de Glace, one of the glaciers near Mont Blanc, in September, 1842. He there met with an American traveller, who, in passing a particular spot on the previous day, had slipped over a precipice, and was only saved from destruction by his clothes being caught in some bushes. He fell on a little ledge not more than a foot

* See No. 772, p. 140.

in width, and on this dreadful prison he had to pass the night. He was twenty feet below the edge of the precipice, and had beneath him another precipice two hundred feet deep; the ledge was only a few feet long, and it was physically impossible for him to have climbed up, down, or around, his rocky resting-place. The guides who attended Mr. Forbes fortunately happened to hear his appeals for succour on the following morning; and at great peril to their own lives, they hauled him up. He was nearly deranged, from the mental agony he had suffered for so many hours. This incident has no particular reference to the scientific object of Mr. Forbes's visit, but it is interesting as illustrating the dangers attending these ramblings.

In the further progress of this same journey Mr. Forbes and his guide slept two nights on the slope of a mountain. Their object was to make observations on a more elevated part of the mountain; and the distance from there to a habitable spot below was too great to be accomplished in one day. They made a fire of jumper-bushes on the ice, and slept each in a kind of bag made of a strong blanket, laid upon a chamois-skin. But they were afterwards driven from their little camp by a terrific thunderstorm, which is described as having been one of the most sublime exhibitions that can be conceived.

On another occasion, this traveller and two guides ascended to the Col du Géant from Courmayeur, in a manner which gives one some idea of the fatiguing exertion sometimes considered necessary in these excursions. There was a particular spot, at which it was deemed desirable to make the halt for the night; and this was at so great a distance, that in order to gain time the traveller began their day one hour after midnight, with the moon shining full on them. Mr. Forbes carried a barometer, a geological hammer, a compass, and a telescope; one of the guides carried a knapsack, and the other carried provisions. The lower part of the route was well known to the guides, and the party continued a steady progress for two hours: after a few observations had been made on surrounding objects, the party rested on a plateau or terrace on the mountain side. They had walked three hours, and now sat down to a breakfast of "hard eggs and cold tea," with the temperature rather below the freezing-point. They soon renewed their journey, and exchanged grassy slopes for steep rugged rocks, up which they had to climb amidst loose masses of stone. They allowed nothing to stop them, but proceeded steadily forward towards a point that they had previously marked out for themselves. This was the point where Saussure had passed his seventeen days, half a century before. They reached it after seven hours' walking and climbing, during which they had ascended no less than seven thousand feet. While a breakfast of cold fowl was preparing, Mr. Forbes viewed the magnificent scene around, a scene rarely if ever observed at so early an hour as eight in the morning.

The travellers made but a very small stay here, as they had a long descending journey to make that same day. They very soon had to enter upon a glacier, on whose surface they were to walk several hours. They tied themselves together with two strong cords, Mr. Forbes having one of the guides before him and the other behind him; this arrangement being adopted to enable each one to help either of the others in time of need. They had not gone far before the first guide sunk up to his middle in a hole; and this was one of the many instances which showed the ropes to be of good service. They came by degrees to a spot where the glacier was so full of fissures and crevices that the utmost precaution was necessary in taking every step. Besides the dangers of traversing the ice itself, there was that which results from the falling of masses of rock on the sloping surface of the ice, gathering strength as they fall, and forming at length a dry avalanche which threatens to overwhelm everything in its progress.

The travellers wanted to get down to the Mer de Glace beneath: but on every side they found gaping chasms which deterred them. At last they were forced to descend some of the crevices themselves, then leap over to any projecting ledge, and then climb up on the other side, under circumstances where a slip of the foot would have been certain death. "Many a time," says Mr. Forbes, "we were obliged to return, and many a weary circuit was to be made in order to recommence again; but we seldom failed ultimately to recover the chamois track, which is the safest guide in such situations. The excitement was highly pleasing. The extrication from our dilemma was like playing a complicated game, and the difficulty of the steps was forgotten in the interest of observing whether any progress had been gained; for now we were obliged to descend into the bosom of the glacier, and to select its most jagged and pulverized parts, in order to cross the "crevasses" where they had become choked by the decay and subsidence of their walls. Thus hampered by our icy prison, we only emerged occasionally so as to catch a glimpse of what lay beyond, and to estimate our slow and devious progress. At length, by great skill on the part of Couttet, and patience on the part of us all (for we remained inseparably tied together all this time), by clambering down one side of a chasm, up another, and round a third, hewing our steps, and holding on one by one with the rope, we gradually extricated ourselves from a chaos which at first sight appeared absolutely impenetrable." They rested on the solid part of the glacier about one o'clock; then started again, and reached their place of destination about four in the afternoon, having been walking and climbing almost incessantly for fifteen hours.

In August, 1842, M. Studer and Mr. Forbes agreed to traverse the neighbourhood of Mont Rosa together. They took with them three guides, who were heavily laden with baggage, instruments, and a provision of rice, bread, and meat for three days. In one part of this journey they had to descend from one glacier to another, or from a higher platform of ice to a lower glacier; and this was effected in a manner likely to shake any but the firmest nerves. They skirted along the edge of the precipice, endeavouring to find some spot where the snow would form a descending incline somewhat less perilous than a vertical icy wall. At length they succeeded in finding a place where a very steep mass of snow connected the higher with the lower, with the exception of a "bergschrund," or yawning gap, which they had to avoid in the best way they could. "We were now separated by perhaps but two hundred feet from the glacier beneath. The slope was chiefly of soft deep snow, lying at a high angle. There was no difficulty in securing our footing in it, but the danger was of producing an avalanche by our weight. This, it may be thought, was a small matter, if we were to alight on the glacier below; but such a surface of snow upon rock rarely connects with a glacier without a break, and we all knew very well that the formidable "bergschrund" was open to receive the avalanche and its charge, if it should take place. We had no ladder, but a pretty long rope. Pralong (one of the guides) was tied to it. We all held fast on the rope, having planted ourselves as well as we could on the slope of snow, and let him down by degrees to ascertain the nature and breadth of the crevasse, of which the upper edge usually overhangs like the roof of a cave, dropping icicles. Were that covering to fail, he might be plunged, and drag us, into a chasm beneath. He however, [illegible]ted the

passage with a coolness which I have never seen surpassed, and shouted the intelligence that the chasm had been choked by previous avalanches, and that we might pass without danger. He then (having loosed himself from the rope) proceeded to explore the footing on the glacier, leaving me and the other two guides to extricate ourselves. I descended first by the rope, then Biona, and lastly Fairraz, who, being unsupported, did not at all like the slide, the termination of which it was quite impossible to see from above."

On another occasion in the same year, Mr. Forbes, with David Couttet and Auguste Balmat (two guides of whose judgment and carriage he speaks very highly), had to cross the Mer de Glace at a time when it was covered with snow. The greater part of the glacier was covered with snow to the depth of a foot and a half, thereby concealing many holes in the ice. The snow too was falling very thickly. It required their utmost caution and knowledge of the route to prevent falling into the pits and crevices; and after some time the snow blew in their faces so fiercely that they were glad to shelter themselves behind a great stone, and have some breakfast. At length they were fairly beaten back by the snow-storm; but not till Mr. Forbes had made a few observations on the structure and slow movement of the glacier.

We have given these few notices, not so much to explain the nature of the scientific observations made on Glaciers, or the conclusions to which these have led, as to show what hazards and inconveniences men of science will incur in the prosecution of these inquiries. The general character of M. Agassiz's theory of glaciers has been given in No. 756; and it will suffice here to say that Mr. Forbes considers a glacier to be a mass of semifluid ice; that is, ice and water and snow so mixed together as to form a plastic mass, like mortar or stiff mud, capable of moving slowly down an inclined plane, such as most mountain-valleys are. The addition of snow every winter, the melting of a portion every summer, and the subsequent freezing of a portion of the melted snow into ice, give to the whole mass the mixed character which distinguishes it; and, by considering the differing velocity which different parts of a viscid mass would move down an incline, owing to friction and other causes, Mr. Forbes considers that he can explain certain systems of veins and crevices which traverse the ice, as also the slow downward motion observable in all glaciers.



(Group from the Heliodorus.)

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXXII.

RAPHAEL AT ROME.

IN his twenty-fifth year, when Fra Bartolomeo, Leonardo da Vinci, and Michael Angelo were all at the height of their fame, and many years older than himself, the Young Raphael had already become celebrated from one end of Italy to the other. At this time Julius II. was pope. Of his extraordinary and energetic character we have already spoken at length in the life of Michael Angelo. At the age of seventy he was revolving plans for the aggrandizement of his power and the embellishment of the Vatican, which it would have taken a long life to realise; conscious that the time before him was to be measured by months rather than by years, and ambitious to concentrate in his own person all the glory that must ensue from such magnificent works, he listened to no obstacles, he would endure no delays, he spared no expense in his undertakings. Bramante, the greatest architect, and Michael Angelo, the greatest sculptor in Italy, were already in his service. Leonardo da Vinci was then employed in public works at Florence, and could not be engaged, and he therefore sent for Raphael to undertake the decoration of those halls in the Vatican which Pope Nicholas V. and Sixtus IV. had begun and left unfinished. The invitation, or rather order, of the pope was as usual so urgent and so peremptory, that Raphael hurried from Florence, leaving his friends Bartolomeo and Ghirlandajo to complete his unfinished pictures, and immediately on his arrival at Rome he commenced the greatest of his works, the Chambers (*Camere*) of the Vatican.

In general, when Raphael undertook any great work illustrative of sacred or profane history, he did not hesitate to ask advice of his learned and literary friends on points of costume or chronology, but when he began his paintings in the Vatican he was wholly unassisted, and the plan which he laid before the pope, and which was immediately approved and adopted, shows that the grasp and cultivation of his mind equalled his powers as a painter. He dedicated this first saloon, called in Italian the 'Camera della Segnatura,' to the glory of those high intellectual pursuits which may be said to embrace in some form or other all human culture—he represented Theology, Poetry, Philosophy, and Law (or Jurisprudence).

And first on the ceiling he painted in four circles four allegorical female figures with characteristic symbols, throned amid clouds, and attended by beautiful genii. Of these the figure of Poetry is distinguished by superior grandeur and inspiration. Beneath these figures and on the four sides of the room he painted four great pictures, each about fifteen feet high by twenty or twenty-five feet wide, in subject illustrating historically the four allegorical figures above. Under Theology he placed the composition called '*la Disputa*,' i. e. the argument concerning the holy sacrament. In the upper part is the heavenly glory, the Redeemer in the centre, beside him the Virgin-mother. On the right and left, arranged in a semicircle, patriarchs, apostles, and saints, all seated; all full of character, dignity, and a kind of celestial repose befitting their beatitude. Angels are hovering round: four of them, surrounding the emblematic Dove, hold the Gospels. In the lower half of the picture are assembled the celebrated doctors and teachers of the Church, grand, solemn, meditative figures; some searching their books, some lost in thought, some engaged "in colloquy sublime." And on each side, a little lower, groups of disciples and listeners, every head and figure a study of character and expression, all different, all full of nature, animation, and significance; and thus the two parts of this magnificent composition, the heavenly beatitude above, the mystery of faith below, combine into one comprehensive whole. This picture contains about fifty full-length figures.

Under Poetry we have Mount Parnassus. Apollo and the Muses are seen on the summit. On one side, near them, the epic and tragic poets Homer, Virgil, Dante. (Ariosto had not written his poem at this time, and Milton and Tasso were yet unborn.) Below, on each side, are the lyrical poets Petrarch, Sappho, Corinna, Pindar, Horace. The arrangement, grouping, and character are most admirable and graceful; but Raphael's original design for this composition, as we have it engraved by Marc Antonio, is finer than the fresco, in which there are many alterations which cannot be considered as improvements.

Under Philosophy he has placed 'The School of Athens.' It represents a grand hall, or portico, in which a flight of steps separates the foreground from the background. Conspicuous, and above the rest, are the elder intellectual philosophers Plato, Aristotle, Socrates: Plato characteristically pointing upwards to heaven; Aristotle pointing to the earth; Socrates impressively discoursing to the listeners near him.

Then, on a lower plan, we have the Sciences and Arts, represented by Pythagoras and Archimedes; Zoroaster, and Ptolemy the geographer; while alone, as if avoiding and avoided by all, sits Diogenes the Cynic. Raphael has represented the art of painting by the figure of his master Perugino, and has introduced a



[Pope Julius II.]

are often included in the same enumeration as Rhine wines properly so called. One kind obtains the designation of "Liebfrauenmilch;" but in general the wines are named after the towns or vineyards where they grow.

With respect to the general character of all these wines, Dr. Henderson makes the following remarks:—"The wines of the Rhine may be regarded as constituting a distinct order by themselves. Some of the higher sorts, indeed, resemble very much the vins de Graves; but in general they are drier than the French white wines, and are characterized by a delicate flavour and aroma, called in the country *gäre*, which is quite peculiar to them, and of which it would therefore appear to be in vain to attempt the description. A notion prevails that they are naturally acid; and the inferior kinds, no doubt, are so; but this is not the constant character of the Rhine wines, which, in good years, have not any perceptible acidity to the taste—at least not more than is common to them with the growths of warmer regions. But their chief distinction is their extreme durability, in which they are not surpassed by any other species of wine.

CONSTANTINOPLE.

It was five in the morning, I was standing on deck; we made sail towards the mouth of the Bosphorus, skirting the walls of Constantinople. After half an hour's navigation through ships at anchor, we touched the walls of the Seraglio, which prolongs those of the city, and form, at the extremity of the hill which supports the proud Stamboul, the angle which separates the sea of Marmora from the canal of the Bosphorus and the harbour of the Golden Horn. It is there that God and man, nature and art, have combined to form the most marvellous spectacle which the human eye can behold. I uttered an involuntary cry when the magnificent panorama opened upon my sight; I forgot for ever the bay of Naples and all its enchantments; to compare any thing to that marvellous and graceful combination would be an injury to the fairest work of creation.

The walls which support the circular terraces of the immense gardens of the Seraglio were on our left, with their base perpetually washed by the waters of the Bosphorus, blue and limpid as the Rhone at Geneva; the terraces which rise one above another to the palace of the Sultana, the gilded cupolas of which rose above the gigantic summits of the plane-tree and the cypress, were themselves clothed with enormous trees, the trunks of which overhang the walls, while their branches, overspreading the gardens, spread a deep shadow even far into the sea, beneath the protection of which the panting rowers repose from their toil. These stately groups of trees are from time to time interrupted by palaces, pavilions, kiosks, gilded and sculptured domes, or batteries of cannon. These mafitime palaces form part of the Seraglio. You see occasionally through the muslin curtains the gilded roofs and sumptuous cornices of those abodes of beauty. At every step, elegant Moorish fountains fall from the higher parts of the gardens, and murmur in marble basins, from whence, before reaching the sea, they are conducted in little cascades to refresh the passengers. As the vessel coasted the walls, the prospect expanded—the coast of Asia appeared, and the mouth of the Bosphorus, properly so called, began to open between hills, on one side of dark green, on the other of smiling verdure, which seemed variegated by all the colours of the rainbow. The smiling shores of Asia, distant about a mile, stretched out to our right, surmounted by lofty hills, sharp at the top, and clothed to the summit with dark forests, with their sides varied by hedge-rows, villas, orchards, and gardens. Deep precipitous ravines occasionally descended on this side into the sea, overshadowed by huge overgrown oaks, the branches of which dipped into the water. Farther on still, on the Asiatic side, an advanced headland projected into the waves, covered with white houses—it was Scutari, with its vast white barracks, its resplendent mosques, its animated quays, forming a vast city. Farther still, the Bosphorus, like a deeply imbedded river, opened between opposing mountains—the advancing promontories and receding bays of which, clothed to the water's edge with forests, exhibited a confused assemblage of masts of vessels, shady groves, noble palaces, hanging gardens, and tranquil havens.

The harbour of Constantinople is not, properly speaking, a port. It is rather a great river like the Thames, shut in on either side by hills covered with houses, and covered by innumerable lines of ships lying at anchor along the quays. Vessels of every description are to be seen there, from the Arabian bark, the prow of which is raised, and darts along like the ancient galleys, to the ship of the line, with three decks, and its sides studded with brazen mouths. Multitudes of Turkish barks circulate through that forest of masts, serving the purpose of carriages in that maritime city, and disturb, in their swift progress through the waves, clouds of alabastros, which, like beautiful white pigeons, rise from the sea on their approach, to descend and repose again on the unruffled surface. It is impossible to count the vessels which lie on the water from the Seraglio point to the suburb of Eyoub and the delicious valley of the Sweet Waters. The Thames at London exhibits nothing comparable to it.

Beautiful as the European side of the Bosphorus is, the Asiatic is infinitely more striking. It owes nothing to man, but everything to nature. There is neither a Buyukdéré nor a Therapia, nor palaces of ambassadors, nor an Armenian nor Frank city; there is nothing but mountains with glens which separate them; little valleys enamelled with green, which lie at the foot of overhanging rocks; torrents which enliven the scene with their foam; forests which darken it by their shade, or dip their boughs in the waves; a variety of forms, of tints, and of foliage, which the pencil of the painter is alike unable to represent or the pen of the poet to describe. A few cottages perched on the summit of projecting rocks, or sheltered in the bosom of a deeply indented bay, alone tell you of the presence of man. The evergreen oaks hang in such masses over the waves, that the boatmen glide under their branches, and often sleep cradled in their arms. Such is the character of the coast on the Asiatic side as far as the castle of Mahomet II., which seems to shut it in as closely as any Swiss lake. Beyond that, the character changes; the hills are less rugged, and descend in gentler slopes to the water's edge; charming little plains, checkered with fruit-trees and shaded by planes, frequently open; and the delicious Sweet Waters of Asia exhibit a scene of enchantment equal to any described in the Arabian Nights. Women, children, and black slaves, in every variety of costume and colour; veiled ladies from Constantinople; cattle and buffaloes ruminating in the pastures; Arab horses clothed in the most sumptuous trappings of velvet and gold; caïques filled with Armenian and Circassian young women, seated under the shade or playing with their children, some of the most ravishing beauty—form a scene of variety and interest probably unique in the world.—*From M. Lamartine's Travels, as translated in Blackwood's Magazine.*



[Frederic II.]

THE RÖMER AT FRANKFORT.—No. III.

In the picture of this emperor, of which the above is a copy, the artist, Philip Veit, has represented him, according to M. Schott, as a man in whom the German was beautifully united with the Italian and the Oriental. Palms, cypresses, and olives betoken the enchanting south, where grace and intellectuality predominate, while the blue eyes and light hair mark the son of the Hohenstauffens. In the background is seen Palermo, his favourite residence, the "happy city," as it is commonly called in his official documents, the meeting point between the Italian and the Greek, the German and the Arabian peculiarities. Here scholars, poets, and artists, assembled by him, emulated each other. Here shone the noblest dames of his widely extended realm; from hence the Western world received his laws in all that related to beauty, wit, and manners. Together with these the pleasures of the chace were ardently pursued. In reference to this Frederic is represented as about to fly a falcon, and waits like it attentively for the moment when its prey is within reach. How clearly to the intellectual man even minor realms of knowledge developed themselves, is shown by his writings on the art of hawking and the management of hawks, which have ever been admired as models of acuteness, industry, and taste. On the ground lies one of those tamed leopards which, taught like dogs and ready for a spring, were carried in hunting behind the rider. The laurel crown on his right arm reminds us of the poetical endowments of the emperor. What Dante did for the Italian language only became possible through the development which it previously received under the Hohenstauffen race. As in Frederic's time the towns and cities of Germany re-echoed with their native poetry, so from Palermo yet sound to us numerous ballads in the Sicilian dialect, amongst which are several of the emperor's own. With the tokens of the huntsman and the poet, we see also royal dignity in his slender figure, with lightness of motion the expression of lofty serenity: they tell us that he understood how to unite the pleasures of life with a noble earnestness.

For a character like Frederic II., however some of his pursuits may appear to justify it, we cannot consider the choice of the artist as happy. The figure, in which the leopard is omitted in the engraving, gives an idea of effeminacy which was certainly no part of Frederic's character. He was the grandson of Frederic Barbarossa, but two emperors intervened in the succession of the empire. In 1210, at the age of fourteen, he was elected, but it was not till after the death of Otto IV. that he obtained peaceable possession of his supremacy, and in 1215 he was crowned at Aix-la-Chapelle. "No prince in the middle ages," says the writer in the 'Penny Cyclopædia,' "Charlemagne perhaps excepted, has made so distinguished a figure; the most remarkable period of those ages is connected with his name and his long reign. It was the time in which Innocent III., Gregory IX., and Innocent IV. carried Gregory VII.'s policy to an extent that had been considered as impossible; when the origin of the orders of knighthood, the foundation of the Mendicant orders, and the Inquisition became formidable pillars and supporters of the spiritual edifice; when the nations of Europe were for the first time impressed by the Cru-

sades with one general idea, represented by the symbol of the cross, and drawn closer together; when, after many single voices had died away unheeded or forgotten, a Protestantism of the middle ages was proclaimed by the Waldenses and the Albigenses; when chivalry attained a more elevated position, ennobled by religion and a regular organization; when the class of free citizens gradually rose in estimation and importance, and favoured in Germany by Frederic against the aristocracy, and opposed by him in Upper Italy as instruments of the popes, acquired, by means of great confederations of many cities, and by the institution of corporate bodies, respect abroad and internal strength; when, in opposition to the club-law, a law for ensuring public peace and security was first proclaimed in the German language; when the Secret Tribunal began to act in its first scarcely perceptible commencement; when the first universities excited a spirit of inquiry and research: and when the poetry of the Troubadours found a home in Germany and Italy, and was honoured and cultivated by emperors and kings.

"Frederic, though not tall, was well made; he had a fine open forehead, and a mild and pleasing expression of the eye and mouth. The heir of all the best qualities of all the members of his distinguished race, enterprising, brave, liberal, with excellent natural talents, full of knowledge; he understood all the languages of his subjects, Greek, Latin, Italian, German, French, and Arabic; he was austere, passionate, mild, and generous, as the occasion prompted, cheerful, magnificent, and fond of pleasure. And as his body had gained strength and elasticity by skill in all chivalrous exercises, so his mind and character, early formed in the school of adversity and trial, had acquired a degree of flexibility which those who are born to power but seldom know, and an energy which strengthened and raised him in times of difficulty. But such a body and such a mind were necessary for a man who was to combat in Germany, already divided into parties, a preponderating aristocracy; in Upper Italy a powerful democracy; in Central Italy an arrogant hierarchy; and in his own southern hereditary dominions, to reconcile, and unite by internal ties, the hostile elements of six nations; who, opposed by temporal and spiritual arms, by rival kings, by excommunication and interdict, persevered, conquering and conquered, for forty years—survived the rebellion of a son, the treachery and poison of his most valued friend, the loss of his favourite child—and did not resign the sceptre, which he had held so firmly, till the last moment of his life."

After an eventful and important life, Frederic died in Italy in the year 1250, in the fifty-sixth year of his age and the forty-first of his reign.

THE CLARET AND BURGUNDY DISTRICTS OF FRANCE.

THE wines of Burgundy bear a tolerably close resemblance, in the general circumstances attending their production, to those of Champagne, although there is a difference of flavour sufficiently marked to those who are accustomed to drink both.

The province of Burgundy adjoins that of Champagne on the south, and is in fact pretty nearly a continuation of the same wine-district. As Burgundy, however, is farther south than Champagne, it may have rather a warmer climate, and this may affect the fruit grown there. When Burgundy, under its dukes, was an independent state, the vineyards formed an important part of its riches, and have never ceased to be so under the kings of France.

There is a range of hills, called the *Côte d'Or*, which crosses Burgundy from north-east to south-west, and constitutes the heart of the wine-district. The road from Dijon to Chalon-sur-Saône skirts along this district, and affords a fine view of its luxurious growth. Wherever an advantageous slope towards the south or south-east presents itself, the country is entirely laid out in vines, which give it a rich though not perhaps a picturesque appearance. The Côte d'Or commences about a mile from Dijon, and continues to range at a distance of about a mile from the carriage-road; the hills attaining a height of seven or eight hundred feet. It is aptly described as a wall of hills, covered with vineyards, which form terraces on the sunny side, and then spread along the table-land on the summit. The name of 'Côte d'Or' may be interpreted as the 'Golden Slope,' and may either refer to the richness of the produce, or to a yellowish red colour of the soil seen through the tufty vines. Here, as in Champagne, two adjoining vineyards, with no differences of situation that can be exactly appreciated, will produce qualities of wine widely different; showing that a great number of minute circumstances bear a part in producing the final result. The soil in which the Burgundy grape is produced consists in general of a light black or red loam, mixed with the debris of the calcareous rocks rocks upon which they rèpose. The principal vineyards of the Côte d'Or are all situated between Dyon and Chaguy, and describe an arc of a circle exposed to the sun towards the south-east, and protected on the north-west by the hills behind them. The vines are planted in trenches, at the distance of about two feet apart, and are trained on poles to the height of thirty or forty inches. In the best vineyards they are extremely old; and when old vines are replaced by others, a larger crop is obtained, but it is of an inferior quality.

There is one Burgundy vintage at Côte d'Or very celebrated for the quality of its wine. It is called the *Clos de Vougeot*. This vineyard was once the property of the monks of the neighbouring Abbey of Citeaux, who carried the culture of the grape to the highest perfection—never selling any of the wine, but giving away that which they did not consume themselves. Since then it has changed hands more than once; and Mr. Busby gives the following account of the mode of proceeding adopted at the present day:—

The vineyard contains about a hundred and twelve acres, and produces annually about two hundred hogsheads of wine. The soil near the top of the hill consists of small fragments of whitish limestone, mixed with shells, of which the hill is composed: in the lowest part of the vineyard it merges into a nearly pure clay; the vines nearest the top, in the dry soil, produce the best wine, while those in the lower situations produce the worst. The vintage is in general soon over, the proprietor employing four or five hundred vintagers at the same time. For the red wine, the grapes, as they are brought in, are thrown into large cases or troughs, and there trodden by a number of men with large wooden shoes, till the grapes are nearly all broken. They are then taken up in baskets, with interstices wide enough to allow the grapes to pass through; when a portion of the stalks, generally about two-thirds, are taken out. The whole is then put into a vat, into which the *must*, as it ran from the treading, had been previously put. A space of about twelve inches is left unfilled at the top of the vat, and a sliding lid is then put over, which floats upon the surface.

As soon as the fermentation becomes violent, the swelling of the mass lifts the lid to the height of six inches above the mouth of the vat, by the accumulation of the skins and stalks at the surface of the liquor. The fermentation continues from a day and a half to a fortnight, according to the state of the weather, the best wine being produced by the most rapid fermentation.

When the fermentation slackens, the liquor begins to subside, and the wine is then drawn off into large vats containing seven hundred gallons each. At intervals of three or four months it is pumped into another vat of the same dimensions. The Burgundy of Clos-Vougeot receives no other preparation but this, which is repeated several times, until the desired condition is attained. The age at which the wine is sold is from three to twelve years, the highest price being charged for that which has been kept longest. The quality of different vintages varies considerably: thus, the wine of 1824 was of such low value that it was given to the labourers as their ordinary drink; while that of 1825 was kept for many years as a choice vintage, and sold at a high price.

The *Claret* district of France is at a considerable distance from the provinces where Champagne and Burgundy are produced. The district of Medoc, rather northward of Bordeaux, and between the Gironde and the Bay of Biscay, is the heart of the Claret vineyards. Along the left bank of the river is a strip of land, a mile or two in width, thickly planted with vineyards, and constituting one of the most valuable wine-districts in France. The soil is a light gravel; and it may seem curious that the vine grows where hardly anything else will grow; the gravelly soil being fitted to retain the sun's heat about the roots of the plant after sunset, so that the elaboration of the juice seems to go on as well by night as by day. The vine is here trained exclusively on the espalier fashion, fastened to horizontal laths attached to upright posts, at a height not exceeding one or two feet from the ground, running in an uninterrupted line from one end of the vineyard to the other. Manure is scarcely used in the culture, only a little fresh mould being laid over the roots from time to time, but the plough is driven between the vines four times every season, alternately laying open and covering the roots, a process which is performed by oxen, who traverse the rows without treading on the plants. The vine begins to produce at five years of age, and continues productive, sometimes when two hundred years old, provided its roots have found a congenial soil to penetrate with the fibres, which sometimes extend to a distance of forty or fifty feet.

The claret wines are classed into 'growths' according to their excellence, each particular vineyard producing a peculiar kind of wine. The Bordeaux wines, or clarets (the latter being the name by which they are more generally known in England), of the finest qualities are those produced at the vineyard of Château Margaux, Château Lafitte, Château Latour, and Haut Brion. These are the names by which these kinds of claret are known among the merchants; and the average quantity produced in each season varies from about sixty to a hundred and sixty tuns in each vineyard; the tun containing four hogsheads. Then there are about ten others of 'second growth,' or inferior quality; and lower than these are the third, fourth, and fifth growths, decreasing in the scale of excellence. Sometimes a 'fifth growth' vineyard will be next adjoining to one of 'first growth,' and yet no one can explain clearly why they differ so greatly in quality. Sometimes a good season will bring up the 'second growths' nearly to a level with the first, while a bad season will so lower the quality of the 'first growths' as to render the wine unfit for the English merchants (who are the most fastidious among the purchasers of claret). When the wine is not good enough for England, it is consigned to Holland; and if too poor for that country it is retained in France. England takes more than half of the 'first growths,' but very little of the others; Russia takes a good deal of the best; Holland is the great mart for the second quality; while the lower growths are consumed chiefly in France.

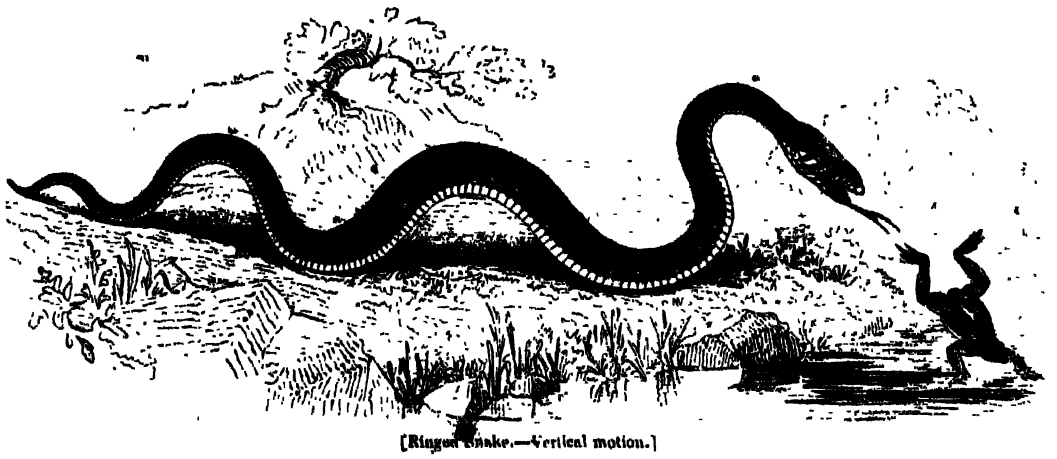
The characteristic of claret is not strength in alcoholic quality, but the possession of a peculiar aroma or 'bouquet;' and the clarets are somewhat modified for the English market by having a small addition of a wine of different quality, prepared at the Rhone vineyards. The total produce of the Médoc district, in average years, is about a hundred and fifty thousand hogsheads. The price of a hogshead of the first growth, in the cellars of the merchants at Bordeaux, is seldom under fifty pounds, which is raised to eighty by the time carriage and duty are paid. Sometimes the whole produce of the vineyard known as the Château Margaux has been sold on the spot at a thousand francs the hogshead.

Miss Costello, in her 'Summer among the Bocages and the Vineyards,' gives a few lively sketches of a wine-district northward of that which we have just noticed—being on the banks of the Loire. In passing along the bank of the river from Saumur towards Tours, the *coteaux* or hill-sides are seen to be clothed with luxurious vines. "Here," says this lady traveller, "are the coteaux of Champigny, Savigny, and a host of others, whose wines are highly esteemed and seldom allowed to leave the country. All along this luxuriant range of hills every inch of ground is golden, and our driver expatiated with great goût on the perfection of their delicious produce. 'Here,' he said, 'in the great year, never to be forgotten in a wine country, 1834, these vineyards were one mass of the richest grapes: so excellent was their quality and so over-abundant their vintage, that the lowest-priced wine for the poorest people was equal to that charged a franc a bottle in other years; unfortunately many abused this advantage, and much sickness was the consequence: to be sure it was difficult to avoid being affected by the wine even though every one drank as usual, for a very different result ensued, one glass being as strong as a dozen of ordinary.' This man, who was extremely intelligent, told us some curious particulars of the customs and manners of the vignerons, who are a class quite apart from others; they are rich, industrious, sober, and respectable; keeping strictly to their own habits, marrying amongst themselves, and being altogether distinguished from their neighbours."

A master vigneron, in this district, after his vintage is completed, and the husks of the grapes alone left, has boiling water poured upon them; the mixture thus produced is put into a cask, and allowed to ferment, until a drink is procured which is the strongest that either he or his men ever indulge in; for they rarely, if ever, exceed the bounds of temperance. All the family, even to the lowest servants, dine at the same board, with a divided part for the master; and all partake of the same very homely food. Before they separate, the master and mistress drink between them one small glass of *real* wine, as a kind of grace-cup to the rest, who then disperse to their occupations.

The vignerons are not long-lived; their work is hard, and the doubled-up attitude in which they have to attend to the vines, distorts the figure strangely. A French writer says of them:—"There is no culture so hard as that of the vine; no fruit more uncertain, nor which the earth yields with more regret, as if she wished to conceal the effect of her own fruitfulness. It is singular how men condemn themselves to an existence which, if forced on them, would be considered an intolerable hardship. All these ridges planted with vine-plants are cultivated by men necessarily bent to the earth: at the age of sixty they can only walk quite bent double." The vine-knife, or 'marra,' has a short handle, and it has often been a matter of surprise why the vignerons should not relieve their painful attitude by having longer handles to these instruments. The word 'tintamarre,' implying

a noise, riot, or confusion, is said to have been derived from one of the customs of these vine-dressers. After the hours allotted to repose amongst the workmen, when the time is come to resume their duties, the vine-dressers call their companions together by striking on their vine-knifes—'tinter-à-la-marre.' In many instance bells do this more effectually; but even this is called ringing the tintamarre. In the time of the conscription, when the peasantry of France were forced into the vast armies of Napoleon, the vignerons had a custom of warning each other from vineyard to vine-yard, at the approach of soldiers, by sounding their 'tintamarre;' and the reply extended itself rapidly along the line. The moment the troops were seen on the horizon, this warning told all the men to disappear in time.



[Ringed Snake.—Vertical motion.]

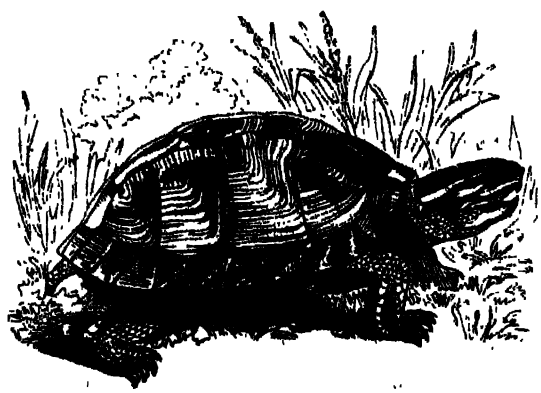
LOCOMOTION OF ANIMALS.—No. XI.

THE lizards and crocodiles present diversified organs of motion. Amongst the former, the gecko is supplied with a peculiar pneumatic apparatus in the feet by means of which it has the power of exhausting the air beneath the toes, and is thus enabled to climb vertically the smooth surfaces of walls, and to walk in an inverted position along the ceilings of rooms. This provision is advantageous to the animal when pursuing the insects on which it preys. In many of the lizards, such as the chameleon, the tail is in like manner used to secure them more steadily on the branches of trees: the hand is furnished with two thumbs opposite to three fingers, and the foot with three thumbs opposed to two fingers. By this arrangement the animal is endowed with considerable facility in taking hold of the branches, being thus provided, as it were, with four hands.

The *Crocodiles* are furnished with four legs, and can walk and run on solids like mammiferous quadrupeds. The bones of the neck and back are, however, so locked together that they cannot turn or twist the body sideways, except in an exceedingly limited degree. They are consequently obliged when moving rapidly to keep in nearly a straight line, and from this cause may be easily avoided by man, should he be pursued by one of these amphibious monsters.

Mr. Waterton gives an amusing account of the capture of a cayman, in the accomplishment of which he embraced the opportunity of riding on its back. He thus describes this extraordinary feat:—"The men pulled the cayman to the surface" (of the water): "he plunged furiously as soon as he arrived at the upper regions, and immediately went below again on their slackening the rope. I saw enough of him not to fall in love at first sight. I told them we would run all risks, and have him out immediately. They pulled again, and out he came. This was an interesting moment. I kept my position firmly, with my eye steadfastly fixed on him. By the time the cayman was within two yards of me I saw he was in a state of fear and perturbation. I sprang up, jumped upon his back, turning half round as I vaulted, so that I gained my seat in the right position. I immediately seized his fore legs, and by main force twisted them on his back: thus they served me for a bridle. He now seemed to have recovered from his surprise, and probably fancying himself in hostile company, began to plunge furiously, and lashed the sand with his powerful tail. I was out of the reach of the strokes of it, by being near his head. He continued to plunge and strike, and made my seat very uncomfortable. It would have been a fine sight for an unoccupied spectator."—Mr. Waterton concludes the description of this exhibition by saying—"Should it be asked how I managed to keep my seat, I would answer, I hunted some years with Lord Darlington's hounds!"—The crocodiles are not calculated for running on land with much speed, as neither the legs nor the structure of their body are well adapted for the purpose; but in water they display great agility.

The *Tortoises* are slower than the crocodilean reptiles. Like the latter, they cannot twist the body on itself; and the ponderous case within which they are



[Amboyna Box-Tortoise.]

enclosed, and which they drag along with the body, resists the freedom of motion of the legs at those points where they pass out of the solid case at *a* and *b* in the preceding figure. This renders their pace exceedingly slow. Their carapace, or shield serves, however, to protect them from injuries arising from the tread of heavy quadrupeds, and is essentially useful to them during their occupation of burrowing. They move on the principles of mammiferous quadrupeds.

Serpents.—We have seen that the crocodiles and tortoises possess little or no power to turn their bodies to the right or to the left; and also that it occupies the last-named animals a long time to change their course from one direction to another. Serpents, on the contrary, have a very great range of lateral motion; and indeed, destitute as they are of legs, were the bones of the back as immoveable as those of the tortoise, they would be deprived of the power of locomotion; but being endowed with very great mobility of the vertebræ, they are enabled, notwithstanding the want of legs, to climb trees, to run with considerable speed on the ground, and to swim rapidly in rivers and lakes. The scales, which are seen on the belly of the animal, enable it to lay hold of fixed objects on the ground, and by the alternate elongation and contraction of the body, it glides along with great celerity. There are several ways in which serpents move, but the most common are the vertical and the lateral modes, seen in the figures at the head and at the end of this article. Further illustrations may be found in detail in the 'Cyclopædia of Anatomy and Physiology.'

The *Frog*, like the crocodile and tortoise, has not the power of twisting its body; it moves by a succession of leaps. It is said that the bull-frogs, which are abundant near the great lakes of North America, can leap six feet at a bound, and repeat these leaps so rapidly, that they cannot be captured without great difficulty. They will leap over walls five feet in height. The hyla, or tree-frog, has each of its toes furnished with a concave disc, which acts as a sucker; and by this means the animal has the power of laying hold of the branches of trees with considerable force, and can leap from branch to branch with great agility. It is by means of the hind legs, which are much longer than the anterior, that the body is projected; the movements are performed on the same principle as those of the kangaroo and jerboa.



[Ringed Snake—Lateral motion.]

THE SAXON WITENAGEMOTE.

The word Witenagemote means literally an "assembly of wise men," from the Anglo-Saxon "gemoth," an "assembly," and "witan," "to know," which has the same root, "wit," or "wis," as the words wit, witness, wise, and the legal phrase still in use "to wit."

Although the chief rulers of the Anglo-Saxon states, nearly down to the time of the Conquest, bore the title of king, and in their charters and letters attached to them many of the sonorous epithets in which, especially among semi-barbarous nations, kings indulge, yet in fact they were little raised in power above the other chiefs of their nation, who either had themselves shared, together with their own particular followers, or were descended from ancestors who had so shared, the risk of the first invasion which seated the tribe in Britain. To election by these chiefs the king owed his office; and if the sceptre descended in his race, it was, if not by force of renewed election, certainly by means of the formal recognition of the new king by the nobles in an assembly convened for the purpose. Of this assembly the chief ecclesiastics in the kingdom, archbishops, bishops, and, abbots, the judges (if such there were), and the largest landholders, formed part. It is said, upon the faith of a single instance, that five hydes of land were an indispensable qualification. Whether the main body of the people had a voice in this great council is doubtful; judging by the analogy of the shire-motes, and of all the political and judicial institutions of our Anglo-Saxon ancestors, it is probable that each district appeared at these national assemblies (even if it did not take an active part in their deliberations) by means of its responsible officers, its reeves, and of the persons who did service for it at the county court: there is however, we believe, no evidence that there was a systematic representation of the people at the witenagemote by persons elected for that specific purpose.

Nor did the functions of these national councils cease with the election of a king: their meetings, if not periodical, were frequent, and were held usually at the great festivals of the year, Whitsuntide, Christmas, and especially Easter; they formed the highest court of judicature in the kingdom; they were summoned by the king in the case of any political emergency; their concurrence is always mentioned in the preamble to the laws, and was necessary to their validity, as well probably as to that of royal grants and charters; and the chief persons who attended them frequently expressed their approbation of such royal acts by their signatures under that of the king.

When the Saxon states were united under the dominion of one king, whether as bretwalda (whatever office that name implied), or by the union of smaller states into one kingdom, the national council retained its powers. It was called by the king, in his grants and laws, his witan, his witenagemote, his mycel synoth (great synod), michel getheaht (great deliberation), his eadigan (worthy); and in Latin by similar names, *e.g.* magnum concilium sapientum, universæ gentis Angliæ concilium; or by names indicating the rank and property of the members, such as optimates, and very frequently proceres. A knowledge of the compo-

sition of this council must be gathered from the words in which its members are mentioned, and (as we have said) from its analogy to other smaller political assemblies.

Mr. Sharon Turner enumerates, from various extant charters, the designations given by the king to his great council in the preambles of those instruments, or added by the members themselves to their signatures: and Sir Francis Palgrave, in his 'Rise and Progress of the English Commonwealth,' more fully sets out many of these documents (*Proofs and Ill*., p ccxviii.). After the signatures, or more frequently crosses, are found the titles of bishop, abbot, deacon, prince, dux, comes, ealderman, minister, miles: and of the great household offices of the palace, pincerna, disc thegn, chief carver, &c. The names especially of ecclesiastics often have some verb after them, which is fantastically varied, as adfui, comprobavi, favi, laudavi, confirmavi, subscripsi, to which the petty kings and archbishops often added consensi, and the king himself frequently adopted in his signature the form "Consentio et signo crucis munio." To some charters the names or crosses of princesses of the royal family and of abbesses appear. In one case the title *electus* follows a name.

A witenagemote in the reign of Ethelwolf (855) granted to the church a tenth, with the assent of the kings, thanes, barons, and people. The eighth law of Edward the Confessor names the people: and the thirty-fifth law recites that it passed by the common advice and assent of all bishops, princes, chiefs (procerum), earls, and of all the wise men and elders, and of the people (populorum) of the whole kingdom. Sergt. Ruffhead, in his preface to the Statutes, conjectures, confessing at the same time his ignorance, that the folcmote resembled our House of Commons, the calra-witenagemote our House of Lords, and the witenagemote our privy council. Undoubtedly some of the functions which in far more recent times the privy council has performed did devolve upon the witan; for instance, their approval was required for certain acts of the king; and generally their office was less to devise measures than to consider and to sanction those which were submitted to them.

In concurring in royal charters and grants, the witenagemote performed the double office of consenting to and of attesting these gifts or privileges; and here their office was analogous to that of the shire-mote, which in those rude days distributed justice rather according to the notoriety of the facts than to any systematic rules of investigating the truth, and qualified itself for this office by requiring that the main transactions touching the rights and property of individuals within its district should pass in its presence.

In those cases where the administration of justice was impossible in the county courts, owing either to their want of jurisdiction, or to the power of one of the parties, the authority of the witan was appealed to; and the nation pledged itself to support the executive power of the king by giving to his arrangements the force of a law. Thus the great family of Godwin, Earl of Kent, was outlawed in 1043, and restored in 1052 by the authority of the witan; in another case the title of a great landholder to estates of which the muniments had been destroyed was acknowledged, and a new deed setting out the bounds was granted.

During the Anglo-Saxon times the possessions of the king, and the ordinary payments made to the crown by every landholder, together with the duties paid by townships, were sufficient for the ordinary wants of the government, especially as the triple duty (trinoda necessitas) of repairing roads and bridges (*brycg-bote*), maintaining the walls of the burgs (*burh-bote*), and resisting invasion (the *fyrd*), was invariable. The king too was entitled to tolls on goods sold in most markets and fairs, and to customs on imported goods; but in those emergencies when a pecuniary contribution was to be made by the nation, the witan were called on to accede to the tax.

If the domestic affairs of the nation were thus considered and confirmed by the witan, treaties with foreign states were equally submitted to their approval. Thus the treaty between Alfred and Guthrun the Danish leader, whereby the eastern counties were abandoned to the Danes, is made with the approbation of the witan.

The duties of the witenagemote were therefore partly legislative, partly, and indeed for the most part, judicial. It was to the whole nation what the shire-mote was to its own district—the court where the king's laws and his most important acts were promulgated, his rights ultimately enforced, and justice administered if denied elsewhere: and in enumerating these offices one is necessarily led to observe the analogy which subsists between that ancient aristocratic assembly and the House of Lords of recent times.

When the Norman Conquest had destroyed all the rights of the English people, it did not obliterate from their minds the memory of their institutions; so again on the one hand the king, as the emergency arose, availed himself of those institutions to strengthen his title or assist his projects; and on the other hand the Norman nobles found in them the means of uniting to themselves the great body of the people, in order to check the oppression or to limit the power of the crown. The circumstances of the Norman invasion, and the fact that the nobles who accompanied William in that enterprise were rather fellow-adventurers than subjects, led necessarily to the calling together by himself and his successors of a general council of his chiefs, sometimes expressly to consult upon state affairs, often only for the avowed purpose of celebrating with him, and at his cost, the great religious festivals of the year. Thierry ('Conquête d Angleterre,' tome i., p. 319), quotes from the 'Cronique de Normandie,' that before William undertook the expedition to England, his immediate counsellors, whose concurrence he had obtained, warned him "that he must also ask aid and counsel of the people generally; for it is just that he who pays should be called to assent;" and that the duke then convened the principal chiefs, ecclesiastics, and merchants. Sir F. Palgrave observes, that the great council of William the Conqueror differed little from the witenagemote, and that the Saxon thanes were mingled in it with the Norman barons. Certainly his muster at Salisbury or Winchester of his Norman companions or their sons at the head of their followers, in 1086, the year before his death, savoured little of a national and constitutional council, although the members of the assembly renewed their oath of allegiance to him, and he promulgated his ordinances, among which was one requiring the maintenance of the law (legem) of King Edward. Ordericus Vitalis says that sixty thousand were then assembled. Henry I., who affected to conciliate his native subjects, summoned a national council by the ancient name of witenagemote.

By degrees the English recovered some political rights: their Norman rulers yielded, at least in words, to their demand for the restitution of their ancient customs, or, as the people called them, the laws of Edward the Confessor: the machinery already established of townships, hundreds, and shires, with their motes, assemblies, and officers, was maintained, as useful for the collection of the crown revenue, and as tending to the maintenance of civil order, by the responsibility which each district incurred for the acts of its inhabitants. Hence, although the ancient popular officer, the reeve, was displaced for the Norman count,

viscount, and bailiff, who derived their authority immediately from the crown, yet the popular assembly, the schire mote, and the habit of representation at this assembly of the burghs and hundreds in the county, remained.

The power of the aristocratic element (unquestionably the main ingredient) in the witenagemote was therefore never suspended, although in its conflicts with the crown it might be greater or less. Its influence was most efficiently shown when, in 1215, the nobles wrested Magna Charta from King John. The popular element in the witenagemote assumed a distinct form when, in the succeeding reign (1265), Simon de Montfort, Earl of Leicester, high-steward of the realm, issued in the king's name writs to the sheriffs of all counties, commanding them to return to the parliament two knights for the county, and two burgesses from every borough, to consult concerning the affairs of the nation.

THE WAITS.

(From Knight's Weekly Volume, 'A Volume of Varieties.')

We have seen "the latter end of a sea-coal fire"—Dame Quickly's notion of the perfection of enjoyment. The snow lies hard upon the ground—icy. The noise of the streets is almost hushed, save that the cabman's whip is occasionally heard urging his jaded horse over the slippery causeway. We creep to bed, and, looking out into the cold, as if to give us a greater feeling of comfort in the warmth within, see the gas-lights shining upon the bright pavement, and, perhaps, give one sigh for poor wretched humanity as some shivering wanderer creeps along to no home, or some one of the most wretched nestles in a sheltering doorway, to be questioned or disturbed by the inflexible police watcher. It is long past midnight. We are soon in our first sleep; and the dream comes which is to throw its veil over the realities of the day-struggle through which we have passed. The dream gradually slides into a vague sense of delight. We lie in a pleasant sunshine, by some gushing spring; or the never-ceasing murmur of leafy woods is around us; or there is a harmony of birds in the air, a chorus, and not a song; or some sound of instrumental melody is in the distance, some faintly remembered air of our childhood that comes unbidden into the mind, more lovely in its indistinctness. Gradually the plash of dripping waters, and the whispering of the breeze among the leaves, and the song of birds, and the hum of many instruments, blend into one more definite harmony, and we recognise the tune, which is familiar to us,—for we are waking. And then we hear real music, soft and distant; and we listen, and the notes can be followed; and presently the sound is almost under our window; and we fancy we never heard sweeter strains; and we recollect, during these tender, and, perhaps, solemn chords, the honied words, themselves music,—

> "Soft stillness and the night
> Become the touches of sweet harmony."

But anon interposes some discordant jig; and then we know that we have been awakened by the Waits.

In the times when minstrelsy was not quite so much a matter of sixpences as in these days, there were enthusiastic people who made the watches of the night melodious, even though snow was upon the ground; and there were good prosaic people who abused them then as much as the poor Waits sometimes get abused now. These were the days of serenaders, and England, despite of its climate, was once a serenading country. Old Alexander Barclay, in his 'Ship of Fools,' published in 1508, describes to us "the vagabonds" whose enormity is so great,

> "That by no means can they abide, ne dwell,
> Within their houses, but out they need must go;
> More wildly wandering than either buck or doe,—
> Some with their harps, another with their lute,
> Another with his bagpipe, or a foolish flute."

But he is especially wrath against the winter minstrels:—

> "But yet moreover these fools are so unwise,
> That in cold winter they use the same madness;
> When all the houses are lade with snow and ice,
> O, madmen amused, unstable and witless!
> What pleasure take you in this your foolishness?
> What joy have ye to wander thus by night?
> Save that ill doers alway hate the light."

The "fools" had the uncommon folly to do all this for nothing. But in a century the aspect of things was changed. The "madmen" divided themselves into sects—those who paid, and those who received pay; and the more sensible class came to be called *Waits*—literally, *Watchers*. If we may judge from the following passage in Beaumont and Fletcher ('The Captain,' Act. ii., Sc. 2), the performances of the unpaid were not entirely welcome to delicate ears:—

> "*Pub.* The touch is excellent; let's be attentive.
> *Jac.* Hark! are the Waits abroad?
> *Pub.* Be softer, pathee;
> 'T is private music.
> *Jac.* What a din it makes!
> I'd rather hear a Jew's trump than these lutes;
> They cry like school-boys."

The *Waits*, according the same authority, had their dwellings in the land of play-houses and bear-gardens, and other nuisances of the sober citizens; and they were not more remarkable than the "private music" for the charms of their serenadings:—

> "*Citizen.* Ay, Ned, but this is scurvy music! I think he has got me the *Waits* of Southwark."

The *Waits* had, however, been long before a part of city pageantry. But as the age grew more literal and mechanical,—as music went out with poetry, when the cultivation of what was somewhat too emphatically called the useful became the fashion,—the Waits lost their metropolitan honours and abiding-place; and came at last to be only heard at Christmas. They retired into the country. The last trace we can find of them, as folks for all weathers, is at Nottingham, in 1710. The 'Tatler' (No. 222) thus writes:—

"Whereas, by letters from Nottingham, we have advice that the young ladies of that place complain for want of sleep, by reason of certain riotous lovers, who for this last summer have very much infested the streets of that eminent city with violins and bass-viols, between the hours of twelve and four in the morning." Isaac Bickerstaff adds, that the same evil has been complained of "in most of the polite towns of this island." The cause of the nuisance he ascribes to the influence of the tender passion. "For as the custom prevails at present, there is scarce a young man of any fashion in a corporation who does not make love with the *Town Music*. *The Waits* often help him through his courtship." The censor concludes, "that a man might as well serenade in Greenland as in our region." But he gives a more sensible reason for the actual decay of serenading, and its unsuitableness to England. "In Italy," he says, "nothing is more frequent than to hear a cobbler working to an opera tune; but, on the contrary, our honest countrymen have so little an inclination to music, that they seldom begin to sing till they are drunk." It is strange that a century should have made such a difference in the manners of England. In Elizabeth's reign we were a musical people; in Anne's, a drunken people. Moralists and legislators had chased away the lute, but they left the gin;

and so madrigals were thrust out by tipsy derry-downs, and the serenader became a midnight bully.

In the days of Elizabeth, and of James and Charles, the people were surrounded with music, and imbued with musical associations. The cittern was heard in every barber's shop; and even up to the publication of the 'Tatler' it was the same: "Go into a barber's anywhere, no matter in what district, and it is ten to one you will hear the sounds either of a fiddle or a guitar, or see the instruments hanging up somewhere." The barbers or their apprentices were the performers: "If idle, they pass their time in life-delighting music." Thus writes a pamphleteer of 1597. Doctor King, about the beginning of the last century, found the barbers degenerating in their accomplishments, and he assigns the cause: "Turning themselves to periwig-making, they have forgot their cittern and their music." The cittern twanged then in the barbers' shops in the fresh mornings especially; and then came forth the carman to bear his loads through the narrow thoroughfares. He also was musical. We all know how Falstaff describes Justice Shallow: "He came ever in the rear-ward of the fashion, and sung those tunes to the over-scutched housewives that he heard the carmen whistle." The carmen had a large stock of tunes. In Ben Jonson's 'Bartholomew Fair,' one of the characters exclaims, "If he meet but a carman in the street, and I find him not loth to keep him off of him, he will whistle him and all his tunes over at night in his sleep." Half a century later even, "barbers, cobblers, and plowmen" were enumerated as "the heirs of music." Who does not perceive that when Izaak Walton's milk-maid sings—

"Come live with me and be my love,"

she is doing nothing remarkable? These charming words were the common possession of all. The people were the heirs of poetry as well as of music. They had their own delicious madrigals to sing, in which music was "married to immortal verse,"—and they *could* sing them. Morley, writing in 1597, says, "Supper being ended, and music-books, according to custom, being brought to the table, the mistress of the house presented me with *a part*, earnestly requesting me to sing; but when, after many excuses, I protested unfeignedly that I could not, every one began to wonder—yea, some whispered to others, demanding how I was brought up." A little band was called "a *noise* of musicians;" it was to be found everywhere; and attended upon the guests in taverns and ordinaries, and at "good men's feasts" in private houses. In Ben Jonson's 'Silent Woman,' it is said, "the smell of the venison, going through the streets, will invite one noise of fiddlers or other;" and again, "They have intelligence of all feasts; there 's good correspondence betwixt them and the London cooks." Feasts were then not mere occasions for gluttony and drunkenness, as they became in the next generation. As the drunkenness went on increasing, the taste for music went on diminishing. The street music was an indication of the popular taste. The execrable sounds which the lame and the blind produced were the mere arts of mendicancy. The principle of extorting money by hideous sounds was carried in London as far as it could go by a fellow of the name of Keiling, called Blind Jack, who performed on the flageolet with his nose. Every description of street exhibition was accompanied with terrible noises. In the fashionable squares, towards the close of the last century, matters were a little mended. After the peace our thoroughfares gradually resounded with the somewhat improved melody of the street-singers of Paris; and a lady with a neat *coiffure* accompanied the organ with the monotonous chant of "Le gai Troubadour." An Italian was now and then imported with his guitar; and his knowledge of harmony compensated for his somewhat cracked voice. All at once glee-singers started up; and they are now common. Then a "noise" or two of really tolerable instrumental performers were to be found in Portland Place and other streets of the west; and even those who were familiar with Rossini might stop to listen. We are still advancing.

The Waits are a relic of the old musical times of England; and let us cherish them, as the frosted bud of a beautiful flower that has yet life in it.

Australian Squatters.—Unlike the squatter in America, the squatter in Australia is a person who, like Abraham, Isaac, and Jacob, follows his flocks and herds into the vast wilderness beyond the settled districts, and fixing on a suitable station previously unoccupied, and generally of twenty or thirty square miles in extent (for which he pays 10*l.* a year to the government as a depasturing licence, together with a tax on each head of large or small cattle he possesses), erects a bark hut, and a stock-yard, and, like Alexander Selkirk, is afterwards, for the time at least, "monarch of all he surveys." According to the government returns, up to the 30th September, 1843, the squatters of New South Wales possessed not fewer than 16,401 horses, 592,333 horned cattle, 3041 pigs, 3,208,129 sheep; while the direct taxes they paid to government for the preceding year amounted to 39,032*l.* 6*s.*

French Notions of English Cookery.—"The voluble vulgar woman I have alluded to before, undertook to give, one evening, partly to me and partly to the 'rest of the world' a description of English *eating*, which certainly had the effect of making me laugh heartily. "Eh! the English do live well!" she began; "the commandant at Toulouse was a prisoner in England, and he has told me; he saw them, and he says he got to like it. First, for breakfast they take a great round of toast, (and madame took the flat of her hand to represent the toast, drawing the other a little way above it to represent also the action,) and they spread it over with a quantity of butter; then they put on that slices of ham and sausages, and—What do you call that other thing the English are so fond of, madame?" "Ale," said I, at a guess. "Yes; oil—they put oil on that, and then they take another round of toast covered with butter, and lay it on the top, and they eat that, and they drink tea *au lait, at the same time*; they eat and they drink, and they drink and they eat, and that is an English breakfast—Eh! they live well, these English!" A little note of admiration went round; and madame enlightened us further respecting English eating. "Then for dinner they take great *cotellettes* of beef," (and here the hands were distended about three-quarters of a yard apart, to designate the size of each rib of beef which formed the '*cotellette*,') "and they only just warm them at the fire; and eat them with great potatoes, boiled, just as they are dug out of the earth—all entire; and they never have but one plate, and they eat the great whole potatoes, and the *cotellette* of beef *tout ensemble*—both together." Another little murmur of wonder, and a suffocated laugh, encouraged the dame to show her further knowledge of English life and eating. "Then," turning to me, "you have what you call *plomb puddin*; and do you know how they make that? Ah! I know all that—*tenez!* They take a great cauldron, and put it over the fire the first thing in the morning; and into that they pour a great quantity of milk and *eau-de-vie*; and then take a vast deal of the fat of the beef, the pure fat, and put it in also; and they thicken it with flour—and—and—What else do you put in your *plomb puddin*, madame?" "Eggs," I replied, with much verity. "Ah! yes, an enormous number of eggs, they put to all that, and then—What else, madame, do you put in your *plomb puddin*?" "Fruit." "Ah! certainly; yes, fruits of all kinds: they chop them together, *all kinds*, and put them into the cauldron, and they stir all up well together, and boil it from morning to evening, and then turn it out into a great basin, and they eat that at dinner with their great raw *cotellettes* (or ribs) of beef and their whole potatoes; and they never have but one plate—Eh! they live well, these English! The commandant learned all their customs when he was prisoner in England, and he told me himself he would be *glad to have had their plomb puddin* every morning for his breakfast: they live so well, these English!"—*Rules in the Pyrenees.*





Effigy of Eleanor, Monument of Eleanor Bohun, wife to Thomas of Woodstock, Duke of Gloucester. — Died 1399.

OLD ENGLISH TOMBS, EFFIGIES, AND MONUMENTAL BRASSES.

The most ancient of the sculptured memorials of the dead now remaining in England are the covering stones of tombs, which are sometimes formed with a roof-like ridge, such as that of William Rufus in Winchester Cathedral; sometimes with a rude effigy in low relief, such as those of three of the old abbots of the dates of 1106, 1114, and 1176, in the cloisters of Westminster Abbey; Roger, Bishop of Sarum, 1193, in Salisbury Cathedral, and Andrew, Bishop of Peterborough, 1199, in Peterborough Cathedral. In those early Norman times the stone coffins of persons of distinction were not buried, but only sunk in the ground to the level of the pavement, the covering slab thus forming the tombstone: occasionally the stone coffin was placed on the pavement, and had an inscription round the edge, or crosses or other emblematic sculptures on the sides. Of the Saxon times there is probably not a single sepulchral memorial known to be in existence, the tombs and shrines of Saxon kings and other memorials which have been supposed to be Saxon, having, it is presumed, been offered as grateful tributes to the memory of founders or benefactors of religious houses long after the death of the persons to whom they have been dedicated.

The stone effigy was at first in low relief, but a bolder style soon became prevalent, and most of those of the twelfth century are in half relief, sculptured however, as before, out of the coverings-slab, of which they consequently form a part.

During the reigns of the first seven kings of the Norman race, the thoughts of the laity must have been too much occupied with the cares and dangers of the unquiet days which were passing over them to pay much regard to the memory of the dead. The clergy were more secure, and to the bishops and abbots we are mainly indebted for such sepulchral memorials of those times as yet remain. Till the reign of Henry III. however, they are few, and those chiefly of bishops and abbots, and the highest of the nobility. Of those first seven kings the tombs of only two now exist in England. William I. was buried at Rouen: William II. in the choir of Winchester Cathedral, where his stone coffin of grey marble yet remains: Henry I. in Reading Abbey; Stephen in Faversham Abbey; Henry II. and Richard I. in the abbey of Fontevrault, in France, where their tombs remain, with stone effigies of themselves and their queens, Eleanor and Berengaria; King John in Worcester Cathedral, where his tomb and effigy still exist, but the effigy is said to be of later date than the tomb. Most of the early effigies represent bishops and abbots, in which there is much uniformity in the mode of representation. The figure is often treading on a dragon (the evil principle), and crushing it with the crosier or pastoral-staff, which is held in one hand while the other holds a book or is raised in the act of benediction. During the same period canopies began to be sculptured over the head

of the effigy, generally consisting of a cusped or trefoil arch, sometimes supported by pillars at the sides, sometimes unsupported. Such an arch, resting on pillars, is carved over the head of the effigy of Andrew, abbot of Peterborough, already mentioned. (See Knight's 'Old England,' vol. i. p. 129.) These architectural ornaments were in those days peculiarly appropriate to bishops and abbots, who were the great improvers of architecture, and to whom we are chiefly indebted for the grandeur and beauty of our old cathedrals and abbeys. Almost every man of rank, not an ecclesiastic, was at that time engaged in the Crusades, either directly as a warrior or indirectly as a supporter of the sacred cause. The order of Knights Templars was instituted in 1118, and they were probably the first persons who were represented in their effigies (as indeed their bodies were placed in their coffins) with their legs crossed, a form emblematic of the sacred banner under which they fought. Specimens of such cross-legged effigies are to be seen in the Temple Church, London, which have been recently renewed in exact imitation of the originals. None of the persons here represented were Templars, but they were no doubt 'associates,' of whom there were great numbers among the noble and wealthy, who, in exchange for their pious gifts, were admitted to a sort of imaginary participation of the spiritual blessings which the Templars, by their lives of mortification and holy warfare, were supposed to be entitled to. Nor were Templars and their associates the only persons who were thus represented. Others who had been crusaders but were not associates, and many who had never been at all engaged in the holy wars, are represented with their legs crossed, which continued to be a sort of fashion till 1312, when the order was abolished. The Knights Templars then began to be regarded with abhorrence, and cross-legged effigies afterwards became of rare occurrence.

In the twelfth century the flat grave-stone appears to have come into use. Like the stone effigy in relief, it was mostly laid on the ground or made a part of the pavement above the grave, and generally had a simple inscription deeply cut and often filled with melted lead, of name, date, and 'Orate pro anima,' 'Pray for the soul,' or something to the same effect, addressed to the passenger.

The table-tomb or altar-tomb, raised three or four feet from the ground, was hardly in use before the thirteenth century: and the full effigy, or statue-effigy, recumbent on the slab, was introduced about the same time. The sides of the table tomb were often panelled, and filled with shields of arms and other ornamental records of the deceased. Sometimes there was an inscription on the slab, and no effigy. The effigy on the table-tomb of King John, in Worcester Cathedral, though probably later than 1216, when he died, is yet the earliest statue-effigy known to exist in England, though those of Henry II. and Richard I., with their queens, at Fontevrault, are full effigies and on table-tombs, and, there is no reason to doubt, are anterior to that of John. Another of the earliest of these table-tombs and effigies is that of William Longspee, Earl of Salisbury, in Salisbury Cathedral: he died in 1226. Both tomb and effigy are of wood, painted and gilt. The effigy of William de Valence in Westminster Abbey is of wood, and was originally covered with copper gilt: he died in 1296, and his effigy is recumbent on a chest of wood, which rests on a table tomb of freestone.

Many of the table-tombs are placed in a recess of the wall, in which case there is generally a canopy in front over the whole length of the recumbent figure, usually consisting of two, three, or more cusped or foliated arches, with crocketed finials, ornamented gables, and other embellishments corresponding with the advance of architectural art, but rather preceding than following it. Some of the most magnificent canopies however belong to detached table-tombs, the figure thus stretched out beneath its canopy appearing as if lying in state, to be gazed upon by successive generations. Of the varied and beautiful forms of architectural detail, the canopied table-tombs of Walter Gray, Archbishop of York, in York Cathedral, 1225, Aymer de Valence in Westminster Abbey, 1334, and Hugh Despencer, in Tewkesbury Abbey, 1339, are beautiful examples. (See Knight's 'Old England,' vol. i. p. 285.)

The full recumbent effigy was formed of wood, stone, or brass. Previous to the seventeenth century, effigies of wood and stone were painted in imitation of the personal appearance and usual costume of the deceased: and armorial bearings, canopies, and other ornamental accompaniments were not only painted but gilt. If time had spared the colours, how much the interest would have been enhanced with which we contemplate these resemblances of the long-departed dead. In a few instances the colours partially remain, and in others they have been renewed. Thus Shakspere's effigy in Stratford Church had been more than once repainted, and this process of renovation would probably have continued to be repeated, had not Malone, in his admiration of the classic beauty of uncoloured marble, covered the whole tomb, effigy and all, with white paint, and thus rendered a renewal of the original colours impossible.

Monumental brasses were probably introduced in the early part of the thirteenth century. A 'brass,' as it is commonly called, is a plate of that metal, which was imbedded in a stone slab so as to be level with the surface of the slab, and was fastened down by being laid in melted pitch, and rivetted through the stone. An effigy of the deceased is usually engraved on the brass plate, frequently with a canopy, and generally with armorial bearings, and with angels, saints, and other ornaments, together with inscriptions, sometimes round the border of the slab, but commonly below the feet of the figure. These separate parts were in almost all cases engraved on detached plates, each embedded in a distinct cavity, the dark-coloured stone slab thus forming an appropriate background, which gave distinctness and relief to the engraved brass.

As the recumbent effigies of wood and stone were painted and gilt, thus affording a more complete and life-like resemblance of the individual, as well as adding richness of decoration to the sacred building, so the brasses were not originally in the simple state in which they now appear: the brass was burnished and sometimes gilt, and the incised parts were filled with black or coloured resinous substances, which gave additional distinctness to the engraving, as well as added to the beauty of the figure and its ornamental accompaniments.

It is obvious, from the varieties and peculiarities of feature exhibited, that from the earliest times the effigy in relief, the statue-effigy, and the effigy on the monumental brass were intended as likenesses of the deceased, and, from the mode of representation, it may be inferred that a model of some kind was made of the personal appearance of the individual when lying in state or stretched out in the coffin. Brasses seem to have been occasionally made during the life of the person represented. The brass, for instance, of Abbot de la Mare in St. Alban's Abbey, is known to have been made during his life-time, about 1360, and no doubt under his own inspection.

The brass plates are all of foreign manufacture, of the hard kind of brass formerly called *laton* or *latten*.

The art of making brass was not introduced into England till 1639.

Slabs with brasses are sometimes, but rarely, on table-tombs; they are commonly laid in the pavement of the church, where they offer no impediment to the tread of the congregation.

The origin of sepulchral brasses has been ascribed, with some degree of probability, to the enamelled works in brass which were executed in considerable abundance, chiefly at Limoges, in France, during the eleventh and twelfth centuries. That the art of engraving the plates, as well as the plates themselves, was introduced from France and Flanders into England, will hardly admit of a doubt, when we know that a similar art had previously been practised in those countries, and that early brasses still exist in England which were executed by French and Flemish artists.

One of the two effigies above represented is a reduced copy from a heel-ball rubbing, made from the original brass in the church of Hever in Kent. The female, of whom the original effigy is three feet high, is attired in a kirtle and mantle, with a veil thrown back from her face. The lap-dog at the feet and the angels supporting the cushion on which the head rests, are frequent accompaniments of effigies on monumental brasses. The figure and drapery are very elegant, and the execution, though not of high excellence, is yet much superior to that of most of the brasses of the following centuries. The inscription under her feet is—"Hic iacet Margarita, quondam uxor William Cheyne, quæ obiit xix die mensis Augusti, Anno Domini Millesimo ccccxix., cuius animæ propicietur Deus. Amen" (Here lies Margarita, formerly wife of William Cheyne, who died on the 19th day of August, A.D. 1419, to whose soul may God be favourable. Amen.)

The other brass is a copy of that of Eleanor Bohun, wife of the Duke of Gloucester, who died in 1399. The brass is in Westminster Abbey, and we have introduced it not only as a specimen of beautiful work, but for the purpose of showing the canopy, with coats of arms on the pillars, and the brass border which incloses the whole, and which contains the inscription.

[To be continued.]

Attack of Hornets.—I have seen six companies of infantry with a train of artillery and a squadron of horse all put to the route by a single nest of hornets, and driven off some miles with all their horses and bullocks. The officers generally save themselves by keeping within their tents, and creeping under their bed-clothes or their carpets; and servants often escape by covering themselves up in their blankets, and lying perfectly still. Horses are often stung to a state of madness, in which they throw themselves over precipices, and break their limbs or kill themselves. The grooms, in trying to save their horses, are generally the people who suffer most in a camp attacked by such an enemy. I have seen some so stung as to recover with difficulty; and I believe there have been instances of people not recovering at all. In such a frightful scene I have seen a bullock sitting and chewing the cud as calmly as if the whole thing had been got up for his amusement! The hornets seldom touch any animal that remains perfectly still.—*Lieut.-Col. Sleeman's Rambles and Recollections.*

Light of the Moon.—As the moon's axis is nearly perpendicular to the plane of the ecliptic, she can scarcely have any change of seasons. But what is still more remarkable, one half of the moon has no darkness at all, while the other half has two weeks of light and two of darkness alternately: the inhabitants, if any, of the first half bask constantly in earth-shine without seeing the sun, whilst those of the latter never see the earth at all. You, as just stated, the earth reflects the light of the sun to the moon in the same manner as the moon does to the earth; therefore, at the time of conjunction or new moon, her further side must be enlightened by the sun and the nearer half by the earth; and at the time of opposition or full moon, one half of her will be enlightened by the sun, but the other half will be in total darkness. To the Lunarians the earth seems the largest orb in the universe; for it appears to them more than three times the size of the sun, and thirteen times greater than the moon does to us,—exhibiting similar phases to herself, but in a reverse order: for when the moon is full the earth is invisible to them; and when the moon is new, they will see the earth full. The face of the moon appears to us permanent, but to them the earth presents very different appearances: the Pacific and Atlantic Oceans, in the course of each twenty-four hours, will successively rivet their attention, and the velocity of motion must excite both surprise and conjecture. Though, as aforesaid, certain of those gentlemen only behold the earth for half a month at a time, those near the border see it only occasionally, and those on the side opposite the earth never see it at all.—*Cycle of Celestial Objects, by Captain W. H. Smyth, R.N.*

Silk-worms in Jamaica.—About 36 miles from Spanish Town are the works of the Jamaica Silk Company. This company was incorporated by a local act, dated July, 1841. They purchased 376 acres, on which they have erected two iron buildings and two wooden houses, and planted upwards of two hundred acres with mulberry-trees. The place is called Metcalfe Ville, after their late much-esteemed governor, Sir C. Metcalfe. The soil is a red marl, impregnated with iron, and suits the mulberry-trees extremely well, and the climate in that part of the island is most congenial, the thermometer ranging from 56° to 75° Fahr. In this climate the mulberries are evergreen, and are sufficiently advanced in 12 months to produce food for the worms; in the temperate zones the trees generally take five years to come to the same perfection. They are not allowed to grow into large trees, but are cut down after attaining a certain height, and then spring up afresh from many stems. One of the iron buildings is 225 feet long by 68 feet wide, and 35 feet high. It is furnished with railways and carriages for the conveyance of the food to the height of the shelves where the insects are placed, this is the Cocoonery. Another of the iron buildings, called the Filature, is 110 feet by 50, in which is the reeling apparatus, worked by steam. As silk-worms' eggs require from six to eight months to mature before they hatch, it has been found necessary in this climate to give the eggs an artificial winter, otherwise they would dwindle and die. This artificial winter is obtained by the eggs being put into jars, and these into charcoal, and placed in an ice-house. The worms can thus be taken out according to the time the annual requires for maturity, and the food is always ready for its support. But Mr. S. Whitmarsh, the founder and manager of the company, writes that he has succeeded in "Creolizing" the silk-worms, as he calls it; and as this is of rare occurrence, we give the account in his own words:—"On the morning of 29th April, 1843, as I was examining a cloth of eggs just about to be laid away till the next season, I discovered that the eggs of one 'miller' had hatched,—the others remain dormant to this day, now nearly a year. I fed the live ones carefully, but out of 450 cocoons, obtained only one pair of 'millers' to reproduce in ten days; these again, though fed carefully, dwindled away till all but one pair died, evidently from weakness. I persevered, however, watching the whole with great interest. For the third time, I procured but one pair from 450, but this pair was decidedly stronger than the former ones. The fourth time seven pairs were saved; and from that time they have been gradually improving, till now the eighth generation are the finest and best worms I have ever seen, the cocoons cannot be equalled. I have by crossing obtained the different varieties, all but one producing cocoons of the most brilliant whiteness. India and China have ten-day varieties, but they are so small and yield so little silk, that they are not worth notice; but those of mine are superior to any of the annual varieties, and will no doubt improve by careful cultivation." A few samples of the silk spun at this place were brought to London by Mr. Whitmarsh, and submitted to some of the best judges of the article; and before it was known from whence it was brought, they pronounced it to be first-rate silk, and then worth in the market from 22s. to 32s. per pound. These samples were wound by hand, and before the steam machinery was erected. The black and coloured work-people seem to like the occupation very well; and the company have distributed to all that wished them, mulberry cuttings, to encourage the peasantry themselves to cultivate the worm.—*Osborne's Guide to the West Indies.*



[Group of figures, head and arms. From Raphael's 'Bible']

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXXIII.

RAPHAEL AT ROME.

THOUGH the character of Pope Leo X. was in all respects different from that of Julius, he was not less a patron of Raphael than his predecessor had been, and certainly the number of learned and accomplished men whom Leo attracted to his court, and the enthusiasm for classical learning which prevailed among them, strongly influenced those productions of Raphael which date from the accession of Leo. They became more and more allied to the antique, and less and less embued with that pure religious spirit which we find in his earlier works.

Cardinal Bembo, Cardinal Bibiena, Count Castiglione, the poets Ariosto and Sanazzaro, ranked at this time among Raphael's intimate friends. With his celebrity, his riches increased: he built himself a fine house in that part of Rome called the Borgo, between St. Peter's and the castle of St. Angelo; he had numerous scholars from all parts of Italy, who attended on him with a love and reverence and duty far beyond the lip and knee homage which waits on princes; and such was the influence of his benign and genial temper, that all these young men lived in the most entire union and friendship with him and with each other, and his school was never disturbed by those animosities and jealousies which before and since have disgraced the schools of art of Italy. All the other painters of that time were the friends rather than the rivals of the supreme and gentle Raphael, with the single exception of Michael Angelo.

About the period at which we are now arrived, the beginning of the pontificate of Leo X., Michael Angelo had left Rome for Florence, as it has been related in his life. Lionardo da Vinci came to Rome, by the invitation of Leo, attended by a train of scholars, and lived on good terms with Raphael, who treated the venerable old man with becoming deference. Fra Bartolomeo also visited Rome about 1513, to the great joy of his friend. We find Raphael at this time on terms of the tenderest friendship with Francia, and in correspondence with Albert Durer, for whom he entertained the highest admiration.

Under Leo X., Raphael continued his great works in the Vatican. He began the third hall or '*camera*' in 1515. The ceiling of this chamber had been painted by his master Perugino for Sixtus IV.; and Raphael, from a feeling of respect for his old master, would not remove or paint over his work. On the sides of the room he represented the principal events in the lives of Pope Leo III. and Pope Leo IV., shadowing forth under their names the glory of his patron Leo X. Of these pictures, the most remarkable is that which is called in Italian 'L'Incendio del Borgo,' the Fire in the Borgo. The story says that this populous part of Rome was on fire in the time of Leo IV., and that the conflagration was extinguished by a miracle. In the hurry, confusion, and tumult of the scene; in the men escaping half naked; in the terrified groups assembled in the foreground; in the women carrying water; we find every variety of attitude and emotion, expressed with a perfect knowledge of form; and some of the figures exhibit the influence of Michael Angelo's ceiling of the Sistine Chapel already described. This fresco, though so fine in point of drawing, is the worst *coloured* of the whole series; the best in point of colour are the Heliodorus and the Miracle of Bolsena.

The last of the chambers in the Vatican is the Hall of Constantine, painted with scenes
that emperor. The wh
been executed by the
designs and cartoons, we

only observing that an excellent reduced copy of the finest of all, the Battle of Constantine and Maxentius, may be seen at Hampton Court.

While Raphael, assisted by his scholars, was designing and executing the large frescoes in the Vatican, he was also engaged in many other works. His fertile mind and ready hand were never idle, and the number of *original* creations of this wonderful man and the rapidity with which they succeeded each other, are quite unexampled. Among his most celebrated and popular compositions is the series of subjects from the Old Testament, called 'Raphael's Bible;' these were comparatively small pictures adorning the thirteen cupolas of the "Loggie" of the Vatican. These "Loggie" are open galleries running round three sides of an open court: and the gallery on the second story is the one painted under Raphael's direction. Up the sides and round the windows are arabesque ornaments, festoons of fruit, flowers, animals, all combined and grouped together with the most exquisite and playful fancy: they have been much injured by time, by the barbarous treatment of the French soldiery when Rome was sacked in 1527, and by unskilful attempts at restoration. The pictures in the cupolas being out of reach, are better preserved. Sacred subjects were never represented in so beautiful, so poetical, and so intelligible a manner as by Raphael, but as the copies and engravings of these works are innumerable, and easily met with, we shall not enter into a particular description of them; very good copies of several may be seen at the National School of Design at Somerset House.*

* A set of excellent engravings from the series, in a fine free style, and of a large size, and all executed at Rome after the original frescoes, is now publishing by Parker in the Strand, at the extraordinary low price of six engravings for nine shillings. The subjects, the size, and the fine taste of the execution, render them admirable ornaments for the walls of a school-room or study.

There was still another great work for the Vatican intrusted to Raphael. The interior of the Sistine Chapel was to be hung round the lower walls with tapestries, and the subjects and drawings were to be prepared by him, to be copied in the looms of Flanders. Thus originated the famous "CARTOONS OF RAPHAEL." They were originally ten in number, eight large and two small ones: three are lost, the Stoning of Stephen, the Conversion of St. Paul, and St. Paul in his Dungeon at Philippi; and seven remain, which England is so happy as to possess, and which are now preserved at Hampton Court: 1. the Miraculous Draught of Fishes; 2. Charge to St. Peter; 3. the Beautiful Gate; 4. the Death of Ananias; 5. Elymas struck Blind; 6. St. Paul and Barnabas at Lystra; 7. St. Paul preaching at Athens.*

Raphael finished these cartoons in 1516. They are all from fourteen to eighteen feet in length, and about twelve feet high; the figures above life size, drawn with chalk upon strong paper, and coloured in distemper. He received for his designs four hundred and thirty-four gold ducats, (about 650*l.*) which were paid to him, three hundred on the 15th of June, 1515, and one hundred and thirty-four in December, 1516. The rich tapestries worked from these cartoons, in wool, silk and gold, were completed at Arras, and sent to Rome, in 1519. For these the Pope paid to the manufacturer at Arras fifty thousand gold ducats. Raphael had the satisfaction, before he died, of seeing them hung in their places, and of witnessing the wonder and applause they excited through the whole city. Several sets of tapestries were worked from the cartoons: one set was sent as a present to Henry VIII., and after the death of Charles I sold into Spain; another, or the same set was exhibited in London about a year ago, and has since been sold to the King of Prussia.

* A particular account of the Cartoons is given in a former volume of the 'Penny Magazine,' it has been thought unnecessary to repeat it here. See Vols. I. and II.



[Three Angels coming to Abraham.—From Raphael's 'Bible.']

While all Rome was indulging in ecstasies over the rich and dearly-paid tapestries, which were not *then*, and are still less *now*, worth one of the cartoons, these precious productions of the artist's own mind were lying in the warehouse of the weaver at Arras, neglected and forgotten. Some were torn into fragments, and parts of them exist in various collections. Seven still remained in some garret or cellar, when Rubens, just a century afterwards, mentioned their existence to Charles I., and advised him to purchase them for the use of a tapestry manufactory which King James I. had established at Mortlake. The purchase was made. They had been cut into long slips about two feet wide, for the convenience of the workmen, and in this state they arrived in England. On Charles's death, Cromwell bought them at the sale of the royal effects for 300*l*. "We had very nearly lost them again in the reign of Charles II., for Louis XIV. having intimated through his ambassador, Bardlon, a wish to possess them at any price, the needy, careless Charles was on the point of yielding them, and would have done so but for the representations of the Lord Treasurer Danby, to whom, in fact, we owe it that they were not ceded to France. They remained, however, neglected in one of the lumber-rooms at Whitehall till the reign of William III., and narrowly escaped being destroyed by fire when Whitehall was burned in 1698. It must have been shortly after that King William ordered them to be repaired, the fragments pasted together and stretched upon linen; and being just at that time occupied with the alterations and improvements at Hampton Court, Sir Christopher Wren had his commands to plan and erect a room expressly to receive them,—the room in which they now hang.

In the Vatican there is a second set of twelve tapestries, for which Raphael gave the original designs, but he did not execute the cartoons, and the style of drawing in those fragments which remain is not his. A very fine fragment of one of these cartoons, '*The Massacre of the Innocents*,' is in our National Gallery. It is very different in the style of execution from the cartoons at Hampton Court, and has been painted over in oil, when or by whom is not known, but certainly before 1730. To all these tapestries were rich borders, composed of beautiful arabesques, and groups of boys, and subjects on a small scale from the life of Leo X., astonishing for the endless fertility of fancy, the large and noble style of treatment, and the exquisite grace and propriety which distinguished Raphael in his smallest as well as in his largest and most important productions.

THE WINE-DISTRICTS OF ITALY.

The vine-produce of Italy is placed under singular disadvantage, in respect to the encouragement which commerce would afford to it. If a large demand existed in England for Italian wines, an incentive to improvement would be given, whereby the character of the produce might be greatly improved. But the fiscal arrangements between other countries have had much influence in this respect. On this point Mr. Redding says:—"The wines of modern Italy are all made for home consumption. The interests of commerce, which lead to competition, have not yet interfered to improve them. England amidst her traffic with all the world, drew from Italy raw silk and oil, but held out no premium for the improvement of Italian wines by a demand for them. That Italy does produce good wine is undeniable, as well as that she grows a vast deal of what is very bad. There are many causes which contribute to this, besides the want of a stimulus from commerce. The petty sovereignties of Italy are a blight upon her manufactures no less than upon her civilization. Many of these are shut up to themselves as regards their productions, and cannot interchange with the neighbouring states without a great disadvantage, owing to pernicious duties, high beyond all reasonable limit, compared to the value of the article. It is not, therefore, because England imports no wine from Italy, the opinion is to be entertained that there is no good wine grown there; nor, because the Venetians imported Cyprus wine in considerable quantities, are we to conclude there is none in Italy. That the growths of Italy are not what they ought to be, or what they might be made, no one can deny. A vast deal of wine-fruit is grown in a mode subsidiary to other produce. Wine is made in a defective manner; but it satisfies the home consumer: and this being the only object of the farmer, he is careless of improvement."

There are two modes adopted of training vines, which are distinctly marked in different countries. These are the *high* and the *low* training. The former is where the vines are trained along palisades, or from tree to tree: they are planted, for instance, near a maple, a cherry-tree, or an elm; they are suffered to interlace themselves with the branches of the tree. If the trees which thus support the vines are irregularly planted, some of the fruit may have too much sun and exposure, while others have too little. In some cases a kind of ladder-work is substituted for the trees, about eight or nine feet in height, and placed about the same distance asunder: the vines are then led in festoons from one to the other. The *low*-training ('tige-bas') is adopted where the plant is either naturally of low growth, or where it is kept low by the vine-dresser.

It is the high-training system which is generally adopted in the Italian vineyards; but other circumstances, independent of the actual training itself, lessen the efficacy of the system employed. In many districts corn or vegetables are grown between the vines, in others, the vines are planted upon soils not congenial to their growth; in others, the vines are suffered to run up to any height, and are not pruned at all: some exhibit every quality of vine growing together, without assortment of any kind; in many cases the vine is allowed to expend its luxuriance of growth rather upon the leaves and branches than upon the fruit. One of the authorities whom we before quoted remarks:—"But if the Italians neither prune their vines, nor consult the proper soil for their culture, nor refrain from making them secondary to the other productions of the earth, they are still more censurable in their mode of conducting the process of the vintage. Neither slenderness of capital, nor the iron grasp of foreign or domestic tyranny, can bear any portion of the blame in this respect. The grapes, after being trodden, are all thrown together in the most slovenly manner; ripe and unripe, sound and unsound, are commonly intermingled, and flung into vats that remain uncleaned from the last year's vintage, the press being rarely used. The process of fermentation is conducted in the most careless manner. The must is not suffered to remain without fresh additions until the vintage is over. Whilst in France they will only suffer the pressure of one day's gathering to ferment together, the Italians will throw in fresh must in the height of the process. That wine so made, whatever may be the defects in cultivating the vine, could ever be of tolerable quality, is not to be expected. There are some landowners, however, who possess excellent wine, which they have been at considerable pains to manufacture; but then it is not to be drunk beyond their own families, and has no connexion with what is commonly sold in the country in respect to quality. If the vintage were as well conducted, and the same pa-

taken with the must as in France, very superior wines would be the result; for the climate is matchless."

Among the better kinds of Italian wines are some of those which Naples produces. The highly-prized 'Lacrima Christi'- better known in this country for its startling and rather irreverent name than for its real quality - is one of these. This is a sweet and luscious wine, of which very little is made even in the most favourable years, and that little is deposited chiefly in the royal cellars. Another Neapolitan wine is the 'Vino Greco,' produced from a grape of that name, said to have been brought from Greece. A third kind is a muscadine wine, of fine colour and rich perfume: this is made near Vesuvius; indeed the volcanic nature of the soil in many parts of the Neapolitan territory seems to be very favourable to the production of rich and sweet wines.

The Roman States produce, among others, an aromatic and intoxicating wine called 'Monte Fiascone.' But the wines of Tuscany are, on the whole, deemed better than those of any other Italian district, chiefly because the process of wine-making is better understood. The Grand Dukes, one after another, have taken considerable pains to improve their vineyards, by importing the best species of vines from France, Spain, the Canaries, and other countries; and the wines made at their villas shew that their labours have been attended with considerable success. The nobles are said to sell their wine by retail, at Florence, from their palace-cellars. The mode of bottling adopted at Florence has given rise to the term 'flask of wine;' for it is really in flasks, similar to those in which oil is imported, that the wine is sold. These flasks are of large size, holding three quarts each. When filled with wine a few drops of oil are introduced into the flask, as a means of protecting the wine from the action of the air; and when the wine is about to be used, a bit of tow is introduced into the flask to absorb the oil, previous to the contents being poured out. The Tuscans of all classes drink wine liberally, but without excess; and seem to relish the opinion expressed by one of their poets, that

"Il buon vino fa buon sangue"—

"good wine makes good blood."

Each of the other Italian States has a reputation for some small quantity of its wine, generally an exception to the larger bulk as to quality. Thus, a pleasant, sharp wine, called Asprino, is made in the Campagna. Orvieto produces a sweet wine with a good flavour and perfume. In Bologna most of their wines are boiled: they are effervescent, like champagne, in their natural state, or as 'vino crudo,' and on being boiled they become 'vino cotto.' In some of the districts of South Italy the soil is too rich to favour the perfecting of grapes; for this fruit requires a hot and dry rather than a rich kind of mould. It is said that the vineyards bordering on the southern slopes of the Alps were in former times so much pestered with bears, which devoured the fruit, that the cultivators were obliged to erect small straw huts upon the top of a post, just large enough for a man, from whence he might shoot the animals without being perceived.

ON THE SUPPLY OF WATER IN TURKEY.

The modes of supplying large cities with water are among the most important arrangements of civil economy, and have involved singularly diverse application of scientific or mechanical principles. We are in England, and especially in London, so accustomed to find an abundant supply of water at hand, and procurable with a wonderfully small expenditure of time and trouble, that we are scarcely in a condition to appreciate at its true value the benefits of the system which has gradually grown up among us; since we do not know the inconveniences which the absence of these facilities would occasion.

But in many foreign countries, and especially in early times, the prevailing mode has been to construct a massive straight aqueduct, course, or channel, descending very gently from the reservoir or spring to the point where it is to be used. In Turkey, in the vicinity of Constantinople, two systems have been adopted: the aqueducts of the earlier, or Greek empire; and the hydraulic pillars of the present day. The general features of these we will describe, chiefly from the works of Dr. Walsh and Miss Pardoe.

There are three curious features in these Turkish arrangements, viz., the bendts or reservoirs, the aqueducts or channels, and the enormous cisterns within the city itself. Some of these are not now used by the Turks; but all form part of the general system which we wish to illustrate. A bendt is a reservoir among the hills at a distance from Constantinople. The shores of the Black Sea are exposed to very copious showers of rain, the water from which finds its way into natural recesses, or hollows, between the mountains, where it forms reservoirs. Wherever such rills flowed down the sides of the hills towards one spot, the Greeks of a former age, the then inhabitants of the districts, stopped their course by throwing a mound across the valleys, and in this manner formed numerous triangular lakes at an elevation above the summit level of the city. These reservoirs, called *hydraha*, were highly prized by the Greek emperors. The embankments were faced with marble, adorned with sculpture, and dignified by the name of the sovereign who formed them. They were deemed so sacred, and of such vital importance to the city, that severe edicts were enacted to preserve them; some regulating the planting of trees, some the abstraction of water, one even exacting a penalty of an ounce of gold for every ounce of water stolen! As water is more precious to the Turks than it was to the Greeks, they watch these reservoirs with still greater care and precaution. The name now applied to them is *Bendts*, and their number has been considerably increased since the time of the Greek emperors. One of the largest and most magnificent is called *Valadi Bendt*, from the mother of one of the sultans, at whose expense it was erected.

These, then, are the reservoirs, some of them fifteen miles from the city, whereby Constantinople derives a supply of water for its busy population. We have next to notice the channels through which this water is conducted from the reservoirs to the city. The Greeks used *aqueducts*: the Turks employ *Souterrais* or *Suyterrasi* (for both modes of spelling are adopted by different writers).

The aqueducts are massive arched structures, somewhat analogous in principle to the viaducts of modern railways, but often much more extensive. Many aqueducts, or portions of aqueducts, remain in the vicinity of Constantinople, testifying the combined strength and beauty which characterized their original construction. Miss Pardoe, after alluding to the changes introduced by the Turks in the mode of conveying the water, and to the comparative neglect of the aqueducts consequent on the introduction of the souterrais, proceeds to remark:—"But they were not allowed, nevertheless, to supersede them altogether—a fact which must gratify every lover of the picturesque, as he gazes on the majestic aqueduct of Validè, which is flung across the fair valley of Buyuk-dèrè, terminating the vista as seen from the Bosphorus, and linking the heights with a range of snowy arches. Another, of more vast but perhaps less graceful proportions, and

certainly less happily situated, is that of Solyman, near Pyrgo; it dominates a valley one thousand six hundred feet in width, is formed by a double range of fifty arches, and is of very imposing appearance, and constructed with great solidity. The aqueduct of Valens is one of the most striking objects that meets the eye of the stranger, as he gazes enraptured on the far-famed city of the Bosphorus. Dark, and hoar, and massy, it links two of the seven hills, and spans the peopled valley with a giant grasp; in strong contrast to the gaiety and glitter of the marble mosques and party-coloured houses. Festoons of the graceful wild-vine and the scented honeysuckle drapery its mouldering masonry; masses of the caper-plant, with its beautiful blossoms, conceal the ravages of time; lichens trail among its arches; and a variety of stone-plants, fed by the moisture which is continually oozing through the interstices of the building, flourish in picturesque luxuriance, and lend a glory to its decay."

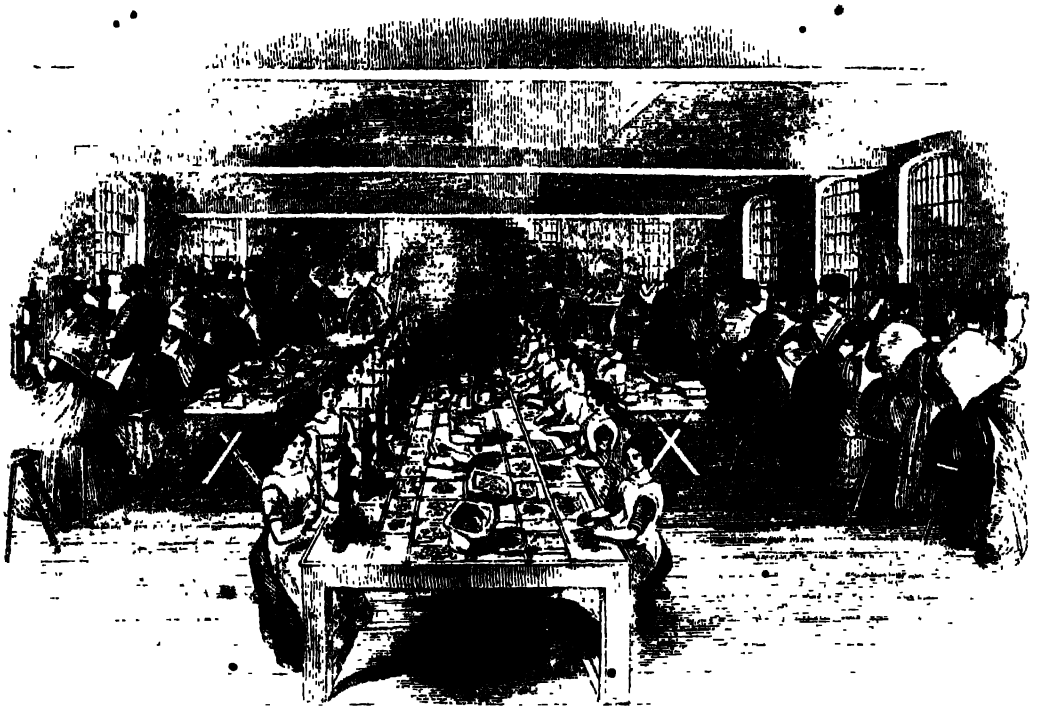
Instead of using solid constructions of masonry, such as these, for conveying the water from the elevated reservoirs to the city, the Turks now use the less costly arrangement of the souterrais. The water is conducted by pipes formed of cylindrical tiles jointed together, and extending the whole distance of fifteen miles. The ravines that break the intervening country are crossed by aqueducts, some of vast dimensions, striding the valleys and towering above the forests. Thus far the aqueduct system is alone employed. But in other cases, the souterrais, which are insulated hydraulic pillars, are placed in long rows, like slender watch-towers. The water ascends one side of each, is received into a small square reservoir on the summit, and from thence descends the other; it climbs the next in a similar manner; and by this contrivance (for which the Turks are said to have been indebted to the Arabs) the vast expense of aqueducts is saved, and the water is conveyed over undulating ground towards the city. The principle on which they act is this: whatever be the undulation of the surface of the ground, the hydraulic pillars are built of such heights that the summit of each one is six inches lower than that of the one preceding it, with respect, not to the surface on which they are built, but to actual water-level. If, therefore, a pipe be laid from the top of one to the top of the next one, whether the intervening portion extend in a straight line or bend along the surface of the ground, the water will be conveyed to the summit of the lower pillar, because that summit is a little lower than the level of the water in the other pillars. In fact, the beudt and souterrais system of modern Turkey is an ingenious combination of the aqueduct principle of early times with the syphon action of modern water-works.

When the water, either by aqueducts or souterrais, has been brought from the beudts to the city, it is there stored in vast cisterns for the use of the inhabitants. Some of these cisterns are fiercely large tanks, or wells, excavated beneath the houses, intended principally to act as reservoirs for rain-water. But besides these, there are four vast subterraneous cisterns yet in existence, which were the work of the Greek emperors, and which were formerly supplied by aqueducts with the waters of the beudts. One of them, called by the Turks, Ben-Veber-Direg, is supported by three hundred and thirty-six pillars of rough marble: and is known as the "Thousand and one," because the separate blocks in forming the columns are said to have amounted to that number; but in the time of the Romans, this cistern was designated the "Stranger's friend," being a public reservoir at which every comer might claim his share. The cistern was computed to contain one million two hundred and thirty-eight thousand cubic feet of water, and to suffice for the consumption of the whole city more than fifty days. It is now, however, perfectly dry, and filled with earth to one-third the height of the columns; no longer used for the purpose to which it was designed, it is occupied in a strange manner, being tenanted by a few miserable silk-throwsters, who here ply their labours in a damp, earthy, and unwholesome atmosphere. There is a tradition which states that the water-courses were diverted from this cistern by order of one of the emperors, who, when digging the foundations of St. Sophia, caused all the soil to be flung into the cistern, rather than submit to the delay necessary to its transport beyond the walls of the city. The channel worn in the stone by the water that once flowed into it is distinguishable on three different sides of the reservoir, which is lighted by narrow grated windows level with the street.

A smaller cistern called the Roudroum, or "Subterranean," is situated near the former. Though smaller in size, it is much handsomer, the columns being at least three times the circumference of those in the other cisterns, and composed each of a single block. Two only of the pillars are imperfect, and the general appearance is said to be very imposing.

But there is one cistern far exceeding in magnitude and in terrible grandeur either of the others; a grandeur increased by the mystery attending both the history and the extent of the cistern. It is sometimes called the Hall of Waters, and in Turkish, by the name of Yerè-Batan-Serai, or "swallowed-up palace." The roof of this immense cistern, like that of Ben-Veber-Direg, is supported by marble columns, distant about ten feet from each other, each formed from a single block, with elaborately wrought capitals, and in some instances, entirely covered throughout the whole length of the shaft with sculptured ornaments in high relief to the level of the water, which varies in depth, according to the season, from five to fifteen feet. Dr. Walsh says of this unparalleled cistern (for such it may well be deemed), "when the Turks took possession of the city, this magnificent work of Grecian art escaped their notice, and remained unexplored and unknown till the time of Gillius, who was in Constantinople in 1550. He appears to be the first who discovered and described this curious subterranean edifice; and so ignorant were the Turks then of its existence, that the houses in the streets above drew water from it and knew not whence it came. From that time, the memory of it was again lost, and travellers, taking Gillius for their guide in exploring the city, searched for this curiosity in vain; and some pronounced that it had no existence, or was confounded with some other. In this state it remained for two centuries more, till Andreossi, the French ambassador, discovered and described it. Again it was lost sight of, owing to the singular apathy and absence of curiosity which distinguish the Turks; until a few years ago, when, part of the wall of a house having fallen in, the astonished proprietor discovered innumerable marble columns, of various orders of architecture, rising out of a vast lake of water, and supporting a lofty arched roof on which his house stood: it was the "Hall of Waters," the memory of which seems strangely to have gone wholly out of the minds of the people, and the only known entrance to which is through this particular house. Many attempts have been made to explore the recesses of this vast cistern in a boat; and many accidents have happened in the attempt; but no exact account seems yet to have been given of the extent of the cistern, or the mode in which water gains entrance to it from the aqueducts or some other source.

A DAY AT THE BIRMINGHAM FACTORIES.



[Stamping, Pressing, and Punching Buttons.—Elliott's Factory.]

It has been a sort of bye-word, that "Birmingham is the toy-shop of Europe." This phrase seems to have sprung up about the time when cheap gilt jewellery became extensively manufactured in that town; a species of goods which well merits admiration, when considered in reference to the skill whereby such economical produce has been rendered attainable; but which has to a certain extent acquired a bad odour from being palmed off, by itinerant hawkers and unscrupulous dealers, as solid gold productions, or at least as possessed of excellences which are really attainable only at a much higher price. But modify the phrase as we may, it goes but little way in characterising the manufactures of Birmingham; since (it may be safely affirmed) there is scarcely a house in the kingdom in which there is not, at almost every hour in the day, some useful article or other employed of Birmingham manufacture. The useful and the ornamental have progressed by parallel steps; and the general arrangements of the town have advanced with them both. Mr. Hawkes Smith, in his account of Birmingham, has alluded to the latter point in the following terms:—"The mode of conducting business in Birmingham has suffered a complete revolution since about 1760, at which period manufactures had multiplied and increased. Previously to that period, the 'Birmingham blacksmith' had been accustomed, from time immemorial, to keep his station at home, where he was visited by ironmongers and other dealers, who resorted to this town twice in the year from all parts of the country, to make their purchases. This was obviously, to the community at large, the most expensive as well as the least eligible mode of effecting the desired purpose; and as the variety of manufactures rapidly augmented, it became almost impossible for the customer to wait on the numerous fabricators. This led first to the employment of *agents*, who made purchases for the country traders, taking a commission for their trouble. These agents afterwards grew into a separate trade, becoming home-merchants, or *factors*, as they are termed. These factors travel through every part of the country, collecting orders, which they execute on their own account; carrying with them specimens of the different articles, if practicable; or pictured representations, where too bulky or too numerous. Their portable show-rooms were long enclosed within the swollen receptacles of a pair of leathern saddle-bags, which were slung across a horse, and on which the traveller, or rider (as he was then technically called), took his seat. But now a tolerably complete set of patterns will weigh 5 cwt., and, with their exhibitor, forms a full and ample load for a one-horse carriage."

The subdivision of trades at Birmingham is so apparently exhaustless, that to examine a small portion of them is all that a writer or a visitor can effect. There are very few large factories, properly so called, in which an article goes through the entire range of manufacturing processes; but there is a vast number of workshops, more or less extensive, in each of which portions of the work are done. One manufactured article, which is sold retail for a penny, may go through twenty workshops before it is finished; some having forty or fifty workmen, some four or five, while some are simply the garrets of workmen who ply their trade by their own fire-side. With the exception of the metropolis, there is perhaps no town in England where

there are so many persons combining in themselves the characters of master and workman, as Birmingham, and none in which there is more observable a chain of links connecting one with another.

The Supplement for October contained a general notice of the gold and silver plate manufacture, including the new art of electro-metallurgy. In this and the next following Supplements, we shall endeavour to group together a few brief notices of other departments of the town's manufacture, such as may serve to give some idea of the variety which they exhibit.

Small work in Gold and Silver.

Whoever looks into the glittering window of a jeweller's and silversmith's shop, will see to what class of articles we here allude. The interminable forms and appearance of the pencil-cases, pen-holders, thimbles, bodkins, toothpicks, tweezers, brooches, finger-rings, ear-rings, chains, bracelets, buckles, clasps, &c., point to the existence of a large and important subdivision of trades at Birmingham. Some of these small trinkets are made of solid gold some of silver, while some have only a thin superficial coating of one or other of these precious metals; but in any or all of these cases, the manufacturing arrangements are pretty much alike. There are warehouses, the proprietors of which form a medium between the small manufacturers and the buyers. They give out their small ingots of silver, or a given weight of gold in sheets, to workmen who, employed at their own homes perhaps, or working three or four for some intermediate master, perform a certain portion of the process of manufacture. A dozen different men or sets of men may be employed at the same time, in a dozen different places, in making certain parts of the same trinket, or some may succeed others in the order of processes; but all alike come at intervals to the warehouse, to render an account of the material they have used, to give in the trinket or part of a trinket which they have made, and to receive payment for their labour; and there are, in every particular branch, persons whose business it is to put together the various pieces of which the article may be made.

A jewellery or trinket-factory, properly so called, is perhaps hardly to be found in Birmingham, since almost every workman, and almost every small master, confines his attention to some one subdivision of processes. But if we were to follow the articles through the various workshops, we should find that the processes of manufacture are generally manipulative, or very little dependent on machinery. For *pencil-cases*, and other articles having a barrelled or cylindrical form, the sheet metal (silver or whatever else it may be) is tube-drawn into shape, something in the same manner as wire; and, by punching, stamping, turning, soldering, and other mechanical processes, is worked up into the finished state. If the barrel be figured or ornamented, as is generally the case, the device is given by passing the sheet-metal between two steel rollers figured with a similar ornament, before being drawn into a tube. In the *ever-pointed pencils* there are many little bits of apparatus to be made separately, such as the tapering point, the wire pusher, the screw, the reserve cell, &c.; but all this is small bench-work, in which lathes, vices, hammers, files, draw-plates, soldering apparatus, &c. are used, on a scale which renders it essentially a handicraft employment. *Thimbles* are brought to shape principally by means of stamps or punching-presses, so arranged as to bend up thin sheets of metal into the required form. If we were to extend our range throughout the list of trinkets and cheap jewellery, we should find that, in respect to the actual manufacture, such tools as we have mentioned, and such work as a man could carry on in a small room, are in most cases adequate to the object in view, and involve a system remarkable rather for the minuteness of its subdivisions than for its unity as a whole.

A large part of the ingenuity of Birmingham has been displayed in finding means to give a golden surface at a small price. No other artisans can make a given weight of gold go so far in gilding trinkets as those of Birmingham; and it thus arises that cheapness of price has nowhere else reached to such an extraordinary extent. "All is not gold that glitters," may be said of gilt jewellery generally; but it must in fairness be said, that the *surface* of these articles is really gold, for however thin the film may be, yet in the cheapest work it is continuous and unbroken, differing from the coating given to better work only in the degree of thinness—except indeed that some of the gold may be more or less "fine" than others. The substance of which the trinket is made may be copper or brass, or one of the numerous modern varieties of "white metal," but all alike are susceptible of receiving a superficial coating of gold. The method of gilding is generally analogous to that which we shall presently speak of in respect of buttons; but the electro process, described in our last Supplement, is becoming extensively applied to this purpose.

Buttons.

Buttons are among the most remarkable manufactures of Birmingham, and one of the few which are conducted on what may fittingly be termed the factory system, since there are establishments in which some hundreds of persons (five or six hundred in one instance) are employed in one building, all making buttons. It is indeed surprising to see the extent to which so trifling an article influences manufactures, when once it has become a ruling item of fashion. When 'florentine' or 'silk' buttons, some few years ago, began to lessen the use of gilt buttons, the trade suffered somewhat of a shock; but things have adjusted themselves to the taste of the day, and the button makers are now among the best-employed artisans of the town. Half a century ago Hutton spoke of the button-trade at Birmingham in the following quaint terms:—"This beautiful ornament appears with infinite variation; and though the original date is rather uncertain, yet we well remember the long coats of our grandfathers covered with half a gross of high tops, and the cloaks of our grandmothers ornamented with a horn button nearly the size of a crown-piece, a watch, or John-apple, curiously wrought, as having passed through the Birmingham press. Though the common round button keeps in with the steady pace of the day, yet we sometimes see the oval, the square, the pea, and the pyramid flash into existence. In some branches of traffic the wearer calls loudly for new fashions; but in this the fashions tread upon each other and crowd upon the wearer. The consumption of this article is astonishing, and the value from threepence a gross to one hundred and forty guineas. There seem to be hidden treasures couched within this magic circle, known only to a few, who extract prodigious fortunes out of this useful toy, whilst a far greater number submit to the statute of bankruptcy. Trade is like a restive horse—can rarely be managed; for where one is carried to the end of a successful journey, many are thrown off by the way." Buttons, it must be owned, are not now such splendid affairs as they were in Hutton's time, but the trade has probably vastly increased in extent.

The materials of which buttons are made are very various, and this variety gives rise to a subdivision somewhat akin to that which we have already noticed, although not so marked. Besides the well known gilt buttons, plain and figured, there are plated, silk,

florentine, and other covered buttons, pearl, horn, shell, bone, wood, glass, and porcelain buttons, and probably many others. The two latter-named varieties are made at the works where either glass or porcelain articles are manufactured; but the rest are produced chiefly at Birmingham, the different manufacturers producing their respective varieties.

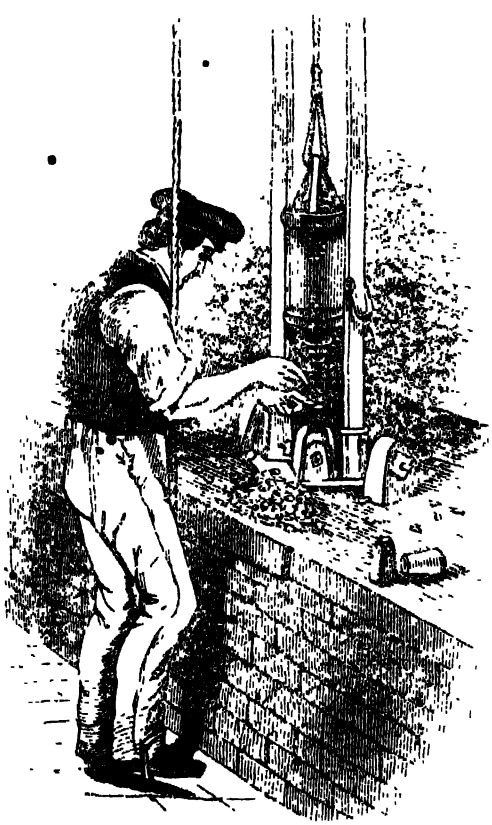
The establishments of Mr. Elliott and of Messrs. Hammond and Turner, two of those in which buttons are made to a vast amount, are among the most interesting in Birmingham. The former of these factories consists of a number of distinct buildings encompassing an open area or court, and each devoted to a particular kind of button-making, or a particular department of the general manufacture. The number of females to which the process gives employment is very large, and the nimbleness with which most of the processes are carried on by them is truly remarkable.

We may first select a common gilt button, and follow it through its processes of manufacture. The material of which these are made is sheet copper, or a mixed metal of which copper is a component part. From these sheets, "blanks" or circular pieces are cut out, a trifling degree larger than the intended size of the button. This is done by means of small presses, of which there is a very large number in various rooms of the factory, devoted to one or other of the different kinds of button. The press for cutting the "blanks" has a circular cutter or punch, worked by a lever or handle; and a female holding a sheet of metal in one hand and the lever of the press in the other, cuts the blanks with surprising rapidity, shifting the copper after each cut in order to expose a new part of the surface, and causing the punch to descend after each adjustment.

Whatever be the form or nature of the button, this preliminary punching of the blank is almost always observed; but beyond this, many varieties occur. The common flat gilt buttons for coats are flat on both sides, and consist of but one thickness of metal, which is punched out in the form of a blank. But there are many kinds of livery buttons, small globular buttons for boys' dresses, and other kinds, which are convex on the outer surface; and this convexity has to be given to them after the blank is cut. Again, of those which are convex, some are of one thickness only, presenting at the back the concave side of the same piece of metal which is convex in front; while others (called "shell" buttons) are hollow, and made of two pieces of metal, one for the front and the other for the back. In this latter case, there are two blanks or circular pieces punched out separately, one called the "shell" and the other the "bottom." The shell, as well as convex buttons generally, is pressed to a convex shape by a machine similar in principle to the punching-press, but having a curved polished surface to act upon the metal, instead of a punch. In this occupation, again, the celerity with which the workwomen stamp each of the little bits of copper consecutively is perfectly wonderful, twelve gross being frequently thus stamped in an hour by one female, or nearly thirty per minute! As each little blank, when made convex, remains in the die, the removal of it by the fingers would consume longer time than the actual stamping; and the workwoman therefore adopts a dextrous mode of jerking out the finished piece in the very act of placing a new one, in the same way that a banker's clerk does when weighing "light sovereigns," but with far more tact and quickness. When it is considered that each little piece of metal is put into the die separately, stamped by a press moved with the hand, and removed from the die before another is placed, and that all this is repeated thirty times in a minute, the celerity with which the hand and fingers must move may be appreciated.

The blanks, as they come from the punching-press, have a kind of rawness of edge, which requires to be smoothed to fit them for their after appearance. This is done by turning each one slightly in a lathe to give regularity of surface. In order to bring the two parts of a "shell" button together, they are exposed to the action of a die and punch so peculiarly adjusted, that the edge of the "shell" becomes bent over and lapped down upon the "bottom," securing the two together in a way at once firm and neat, without the employment of any solder, rivet, or other mode of fastening.

The body of the button, thus formed by any of these means, is frequently decorated on the surface with a device, such as the crest on a livery button, the device on a naval or military button, the few words which are generally stamped on the back of a button, &c. These are always produced after the general form is given to the button, and the dies necessary for this purpose comprise an important part of the stock of the manufacturer. These dies are made of steel, and have engraved on their surfaces the exact reverse of the device to be given. There is in almost all such cases a double pattern, one on the lower die, on which the button is placed, and one on the upper die, or "force," which descends to give a powerful blow to the button. The presses used by the females, for punching and shaping the blanks of the buttons, have not power enough to stamp these devices; and the workmen therefore use a kind of stamping-press such as is here



[Stamping-Press for Buttons.]

shown. The man places the button on the lower die, raises a heavy weight to the lower part of which the upper die is attached, and allows it to fall with great force, by which the button becomes indented with the device engraved on the die.

These processes of punching, pressing, and stamping are variously modified according to the kind of button about to be produced. For instance, a common brace-button has, as is well known, four small holes instead of a shank. The blank is first cut out; then the concavity is given to it by a separate punch or press, and the four holes are pierced by a sharp-pointed punch; and these holes are afterwards "countersunk," or rendered smooth at the edges to prevent cutting the thread, by applying each hole separately to a steel piercer.

The *shank* of a button is in some respects more remarkable even than the blank, partly on account of its manufacturing arrangements—strange as they will appear to most persons. It might well be supposed that in large factories where five or six hundred persons are employed in making buttons, the production of the bit of twisted wire which forms the shank would at least form one of the departments. Yet this is not the case: the button-makers are not shank-makers; the latter branch being carried on by a wholly distinct class of manufacturers, of whom there are three or four in Birmingham. The reason seems to be, that the machinery employed is so costly and intricate, and the value of each shank when made so extremely minute, that nothing less than making for a great many button-makers could pay for the maintenance of a regular establishment; so that the button-makers, as a body, can buy the shanks cheaper than make them.—Thus does the commerce of manufactures adjust and regulate itself when left to seek its natural channels. The shanks are made of brass wire, and vary from eight to forty gross per pound weight. In the beautiful machine now employed for their manufacture, a coil of wire is so placed that one end gradually advances towards a point where a pair of shears cuts off a short piece; a stud then presses against the middle of the piece, and forces it between the two jaws of a kind of vice in a staple-like form; the jaws then compress it so as to form the eye of the shank; a little hammer next strikes the end to make it level; and lastly, another movement enables the shank to drop into a box quite ready for use. It was said a few years ago that three firms in Birmingham make between them six hundred millions of button-shanks every year.

The blank or body of the buttons being ready to receive the shank, they are handed over to workwomen seated at small benches, who proceed to attach a shank to each button with astonishing rapidity. The button is placed down flat, with its back uppermost; the woman takes up a shank, and places it in the proper position on the button; she at the same time takes up a little piece of bent iron, capable of acting as a spring clasp, and clasps the shank tightly to the button; she next touches the foot of the shank, at the junction with the button, with a little solder; and when many dozens or hundreds are thus adjusted, the whole are placed upon an iron plate, and exposed in an oven to a heat sufficient to melt the solder and unite the shank firmly to the button. This clasping of the shank to the button, singly and by hand, is one of the many processes in button-making partaking almost of the marvellous, for the celerity with which it is accomplished.



[Soldering Button Shanks.]

We have not professed to follow the exact order in which the processes are conducted, because this order varies somewhat according to the nature and quality of the button; but we have indicated most of those which actually take place, up to the time when the gilding or silvering is to be effected.

Many kinds of brace-buttons, livery buttons, and soldiers' buttons, have a silvery white appearance, which is imparted to them in a simple but efficient manner. The buttons, after being thoroughly cleansed in an acid solution, are put into an earthen pan containing a dry or nearly dry mixture of silver, common salt, cream of tartar, and one or two other ingredients. The buttons are well worked up with this mixture by means of a brush, and in the course of a minute or two the whole of them are coated with a clear and equable surface of silver.

The gilding is a more elaborate process. The gilt buttons are, in the odd but concise language of the workmen, called "all-overs" or "tops," according as they are gilt all over, or only on the outer, exposed surface. There is also a distinction between the "yellow" and the "orange" gilding, the former being affected in colour by the previous use of a mixture called "similor" ("gold-resembling," as it seems to signify), made of zinc and mercury. We will therefore select an "orange all-over" and an "orange top" as examples of the processes adopted.

For the first of these the buttons, when properly cleaned, are put into an earthen pan, together with some "quick-water" and gold-amalgam, the chemical action of which on each other, and on the button, is very curious. The gold is neither a liquid nor a leaf, but is mixed up into a kind of paste with mercury: this paste, however, will not act upon the button unless a thin film of mercury be previously deposited on the surface; and to produce this deposition is the object of the "quick-water," or "gilders' aquafortis," which is a solution of nitrate of mercury. The buttons, the quick-water, and the amalgam are worked up together in the pan by means of a brush; a chemical (or perhaps galvanic) action takes place between the copper of the button and the mercury of the quick-water, whereby a thin film of mercury becomes precipitated on the button; and in this state the button is prepared to receive a second thin film of the amalgam.

For gilding the "tops," as the object is (for cheapness) to use gold only on the outer surfaces, the buttons are arranged side by side on boards having little holes to receive the shanks. Quick-water is brushed over the surfaces; and after this the amalgam paste is worked on them, to which it adheres only on the parts which have received the thin film of mercury from the quick-water.

In both these cases, then, we have the buttons coated with mercury and gold at their surfaces; and to get rid of this mercury is the object of the next process, one

which has always been deemed very deleterious, but which is now conducted on a better plan than formerly. The buttons are put into the "gilding-cage," an iron wire-gauze cylinder, nine or ten inches in diameter, provided with an iron door and a long handle. This is inserted in a cylindrical oven, so nearly closed



[Cage and Oven, for Button Gilding.]

as only to allow the handle to protrude through the front. The heat within soon causes the mercury to evaporate from the surface, and a very careful arrangement of flues is adopted, to carry off these fumes to separate condensing-chambers, where the mercury resumes its metallic form. A woman sits in front of the oven, and keeps the cage of buttons constantly rotating, by means of a winch-handle, to allow all the buttons to be equally acted on by the heat.

There are about this time other subsidiary arrangements for cleansing the surface of the button, heightening the colour of the gold, &c.; but these we may pass over, and proceed to notice the "burnishing." This process is effected at small lathes, provided with simple apparatus for retaining each button temporarily while it revolves; and a workman, with a burnisher of hæmatite, or blood-stone, burnishes the surface of each button brilliantly in the course of a very few seconds.

Let us next say a few words about florentine and silk buttons, the manufacture of which occupies a large and important department of the factory. It would be worth a penny to buy a coat-button for the purpose of dissecting it piecemeal, were it only to see how complex and ingenious are its arrangements. We should there find (in most specimens) two circular bits of iron, a piece of thick pasteboard, a piece of thick canvas, and the outer silk or florentine covering. All these are cut out by stamping or punching presses, such as we before had to notice. The sheet of iron, of paper, of canvas, or of florentine, is shifted gradually till it is nearly all cut up into little discs; and these operations give to many of the shops the same bustling and busy appearance which our frontispiece represents, nearly all this department of the work being carried on by females.



[Burnishing Buttons.]

The mode in which all the pieces are fixed together is very remarkable. There is no glue or cement, no riveting, no sewing, plaiting, twisting, or other modes of fastening; all being adjusted and fixed simply by stamping or pressure. Within the outer cloth cover is an iron casing called the "shell," within this is a disc of paper, then a disc of cloth, and at the back of all a disc of iron having a hole in the centre, through which some of the canvas is forced as a means for sewing the button on to the coat or garment. All these are placed, in their proper order, in a kind of die or cell, and a descending punch, worked by a press, first fixes the cover to the shell, and then these two to the other three bits, curling up the edges of the two discs of iron in such a peculiar way as to enable them to clasp all the five bits firmly, and to hide all raggedness and imperfections of edge. The internal mechanism of the presses, to effect this, is beautiful and ingenious.

Some of the silk buttons have the iron "shell" blacked with japan before being used: some are convex, while others are flat; some have a woven device in the centre of each, obtained by having the silk or other material woven expressly for the purpose, and by having each little disc marked out carefully by a separate apparatus to ensure accurate punching; some have braided edges, produced by an additional number of pieces, and an additional complication of the stamping process; and indeed there are numerous modifications of the covered button which it would be difficult to particularize here; but the punching out of separate little discs, and the fixing of these by stamping or pressure, are the prevailing features of the manufacture among all.

White linen buttons, of a remarkably neat appearance, are among the novelties of recent times. They consist of a tin or white metal ring, over which a disc of linen is stretched like the parchment of a tambourine; and the beautiful manner in which the two are fixed together by a single action of the press is

very striking. The buttons made of bone, of horn, of wood, of mother-of-pearl, and of other materials, are generally the produce of other manufacturers, who work out their results by the aid of the circular saw, the lathe, the press, and a few other pieces of apparatus.

A finishing department of the factory is devoted to the papering and packing of the buttons, a matter in which almost as much neatness and dexterity are shown as in the making of the buttons themselves. The buttons are sewn on to cards or papers, by girls, with astonishing rapidity; and these cards are packed in pasteboard boxes made with much elegance.

We may finish these few details by remarking, as an example of the vast amount of capital, of skill, and of persevering ingenuity involved in the invention of an article apparently so insignificant as these, that we were shown at this factory a new button, scarcely yet introduced for sale, on which several thousand pounds have been expended, and many months' labour bestowed, before it could be brought to the desired perfection. It is a peculiar composite material, designed to combine the advantages of many others, such as hardness, lightness, strength, and a beautiful silkiness of appearance.

Brass and Bronze Work.

The manufactures in brass, in bronze, in ormolu, and in mixed metals which have an intermediate character between the cheapness of iron and the costliness of gold or silver, is carried on very extensively at Birmingham, chiefly for ornamental purposes. Gates and railings, vases and tripods, chandeliers, lamps, and pedestals, small busts and groups—these are among the subjects to which the manufacture relates.

Some readers probably think brass to be, like copper or tin, a simple metal; but it is not so; it is a mixture of copper and zinc, pretty nearly in the proportion of two of the former to one of the latter. A gold-coloured alloy called "Prince Rupert's metal" consists of about equal weights of copper and of zinc. Bronze, for various purposes of casting, consists essentially of copper and tin, to which a little zinc or lead, or both, are sometimes added, but in every case the copper amounts to eight or nine tenths of the entire weight. For various ornamental purposes, other mixtures of these ingredients are sometimes adopted; but as a general standard, it will suffice to say, that brass consists of copper and zinc, while bronze consists almost wholly of copper, variously but slightly modified by other metals. The mixed metal, of whatever kind it may be, is produced by melting together the component metals into an ingot or other convenient form.

The formation of manufactured articles from brass or bronze involves mechanical operations depending on the kind of article to be made. One very large and fine establishment in Birmingham is devoted to the manufacture of commodities in which brass tubing is principally employed, such as brass bedsteads, curtain rods, gas-fittings, telescope-tubing, and numerous other articles. Other manufacturers, on the contrary, devote their attention principally to such goods as require castings in brass or bronze.

Brass tubing is made from sheet metal, by cutting up the sheet into oblong strips, and bending these round a central core, or mandril, whose thickness equals the intended internal diameter of the pipe. The two opposite edges of the brass are made to lap one over the other, and are in that state soldered together. When soldered, the tube is cleansed and brightened by means of dilute acid, and is then ready for 'drawing.' This drawing has for its object the imparting to the tube a cylindrical form which it could not perfectly attain by the process just described. A mandril or rod is passed through the tube, and the latter is drawn forcibly through a circular hole somewhat smaller than the external diameter of the tube, being at the same time pressed closely in every part to the mandril; by which action both the internal and external surface become regular, cylindrical, and smooth.

When once a rod or a tube of brass is made, the forms into which it may be brought are almost endless, by the turning-lathe, the file, the drill, and other mechanical agents; the operations in this respect differing but very little from those relating to other hard metals.

By far the most important manufactures in brass and bronze are, however, those which depend mainly on casting or founding. Messrs. Messenger's establishment at Birmingham is one of those which exemplify favourably this kind of manufacture. In the recent exposition of ornamental castings in London, having relation to the decoration of the new Houses of Parliament, some beautiful specimens, sent in by this firm, met with especial admiration from the chasteness of design and fineness of execution.

The kind of ornaments thus produced may be for purposes either of strength or elegance: for while on the one hand large gates or balustrades for buildings are often made in this way, so on the other are copies from statues and busts. The gates under the marble arch in front of Buckingham Palace are an example of the former, while specimens of the latter are familiar to most persons.

The arrangements for casting in brass or bronze are very similar to those preparatory to the silver-plate manufacture, noticed in our last Supplement. There must first be prepared a model, representing the form and size of the object to be produced, which model depends for its beauty on the taste of the draughtsman who prepared the original design. Sometimes the models are of clay, sometimes of wax, and in the instance of a magnificent set of gates and balustrades which we saw under process of manufacture at Messrs. Messenger's, the models of all the different parts were turned and carved in mahogany. These models or patterns are sometimes used at once to impress the moulds: but in other instances a permanent metal pattern is produced exactly like the original model, and from this pattern the articles are afterwards made.

The moulding or casting is effected in sand of a very peculiar quality, which has a reverse or cavity depressed in it by the pattern, such as to constitute an exact mould of the object. The brass, bronze, or mixed metal is brought to a liquid state in adjoining furnaces, and is poured into these sand moulds, where it solidifies on cooling. The casting is, in fact, exactly analogous to that exhibited in an iron-foundry, but with the important addition that a very much higher degree of care is required in every part of the operation, both in the fusion of the metal and in the preparation of the mould.

There are various ways of imparting to articles made of brass or of bronze an external beauty of finish which the metal in its original state would not present. Some articles of bronze have an artificial 'verde antique' or old green tint imparted to them, by a composition applied to the surface after casting. Some have a warmer or browner tint; while some are touched on the projecting parts with a gold-coloured powder, which gives a peculiar metallic appearance; but this latter expedient is adopted chiefly where figures or ornaments of plaster are coloured to look like bronze.

Brass-work is brought to a brilliant yellow appearance by the process of lacquering, a process now conducted so skilfully that the lacquered article presents

a very close resemblance to those which have been gilt. When any of the countless articles of brass which Birmingham produces has been formed, by casting, drawing, stamping, chasing, or other mechanical operations, they are cleansed from grease by being heated, then laid to steep or 'pickle' in dilute acid, and brushed well with a wire or other hard brush. Each article is then dipped separately into aquafortis, by which means it speedily acquires a clear bright yellow colour, wholly free from specks and stains; indeed it is the remarkably neat and clear-coloured appearance of the small brass goods which has given Birmingham so much celebrity for them. The cleansed and brightened article is then washed in water, dried in hot sawdust, and then burnished on some or all parts of its surface, according to the pattern and object. The burnishers are made of blood-stone, such as is used for burnishing buttons, and the mode of proceeding is exactly analogous to other metal-burnishing, the article being held in the hand, or down upon a bench, or in a lathe, according to its shape and size.

The brightened and burnished article of brass receives finally a depth and richness of tint by the process of lacquering. Lacquer is a liquid composed of spirit of wine, gum-lac, turmeric, saffron, and one or two other ingredients. The brass-work is made clean and hot, and is in that state coated with a layer of the lacquer, either by dipping or brushing. A subsequent drying finishes the process.

It will be very readily conceived that bronze statues, bells, cannon, lamps and candelabra, ornamental railings, handles, rosettes and scrolls, and the countless other articles made of brass or of bronze, however different they may be as works of high art, are all produced by modifications, more or less marked, of the processes which we have here indicated; and these few may therefore be taken as types of all the rest.

Guns.

The manufacture of muskets is one of the most important branches of Birmingham industry, and one which illustrates as well as almost any other the subdivision to which employments in that town have been subjected. Fowling-pieces, being much less extensively employed, and commanding a higher price, are made to a considerable extent in the metropolis; but the infantry muskets, which are counted by tens of thousands at a time, owe their production in this country almost exclusively to Birmingham. A few years ago, the French government had a hundred and forty thousand muskets made here in seven months; and during the last war it was estimated that Birmingham produced at the rate of a musket per minute throughout the year.

There is no such trade as a gun-maker, properly so called, in Birmingham; or, at least, there is no gun-factory; all the establishments, however large they may be, being devoted to the production of parts only of a gun. The same gun travels about from factory to factory, from shop to shop, before it assumes its finished form; and the only person who could consistently be called a gun-maker is he who has the gun finished by putting the several pieces together.

The first and most important part of a musket is the barrel, and the manufacture of this involves larger arrangements than any other part. These barrels are of two kinds, plain and twisted, the latter being the best and the most expensive. For the plain barrels very tough and good iron is brought to the form of a thick sheet, and is cut to a long strip sufficient for one barrel. This strip, called a 'skelp,' is heated at the thicker end in a fire, placed upon a hollow cavity in an anvil, and hammered so as to turn up the two edges, thereby giving to it a concave form. A mandril is inserted in this cavity, and the hammerman dexterously beats up the iron round this mandril, so as to form it into a tube. The mandril is withdrawn, the iron is again heated to a welding temperature, and hammered until the two meeting edges become united firmly. The whole length of the skelp is gradually and successively treated in the same way.

A twisted barrel is brought to the tubular form in a very curious way. The iron is cut or rolled to the form of very long narrow strips; and one end of a strip being fastened to a rotating mandril or rod, the whole is turned round the mandril in a spiral form, exactly like a spiral spring, or like the worm of a still. This spiral is taken off the mandril, heated, and hammered in such a way that all the edges weld and close together, forming a continuous tube from end to end.

But although a tube is produced by either of these means, it is very coarse and rough both within and without; and to impart the necessary evenness and regularity is now an important matter. The barrel is brought straight by a few blows on an anvil; and is next bored internally by a boring-mill, an instrument so adjusted that the interior of the barrel is scooped or scraped from end to end, until it is perfectly cylindrical and smooth. The exterior is then ground by means of very large rough grindstones, to the surface of which the barrel is applied; in some instances it is turned by cutting tools as in other kind of turning.

After one or two further processes, the barrel is sent to the 'proof-house,' a remarkable feature in the Birmingham arrangements. During the war, a charter or act was granted by which the Birmingham gun-makers were empowered to establish a proof-house, governed by a warden and other officers. This proof-house was to afford the means for testing the strength of the musket-barrels made at Birmingham; in order, on the one hand, that the government might ensure the efficiency of the barrels, and, on the other, that the reputation of the Birmingham manufacturers might not suffer from any of their number selling ill-made barrels. Every maker is bound under a heavy penalty to send every barrel he may make to be tested at the proof-house; and he pays a few pence per barrel as a means of maintaining the expenses of the establishment. The gun-makers themselves are the chief officers of the establishment, elected from time to time, so that a very close connexion exists among all the fraternity.

The proof-house is a large building in the south-east part of Birmingham. In one of the buildings men are employed in receiving the barrels as sent in from the different manufacturers, and loading them, the charge being four or five times as great as the musket will have to carry in actual use. The barrels, as loaded, are handed over to other men, who range them side by side on a low stage in a different building. This building, a dismal-looking place, has a range of open windows or hinged doors on one side, and a large heap of sand on the other, the muzzles of the barrels being directed towards the sand. The barrels are so arranged that the touch-holes shall rest upon a little trough filled with a train of gunpowder; and when about a hundred barrels are so ranged side by side, the men come out of the building, close the doors and openings, and set light to the train, which is brought through to the outside for this purpose. The whole number are fired off at once, producing a deafening report; the contents of the barrels are fired into the heap of sand opposite, and are thus prevented from doing mischief. The doors are then opened, the barrels are removed and examined one by one; and if any have yielded to the explosive force, a man marks with chalk the defective spot, to indicate to the barrel-maker where he must reforge his work. The workmen, who are paid

by the piece, are required to mend the defects in their own work free of extra payment.

The barrels, after proving, are cleaned and finished, and provided with numerous little appendages contingent on their after use. The 'stocker' next takes his part of the routine. He makes the stock of woodwork, generally of walnut-wood, which is cut to the required form by saws, planes, chisels, spoke-shaves, and other tools. The channel to receive the barrel, the cavity for the lock, and all the other peculiarities of shape, are cut out, and the barrel is fixed into the stock by screws and other fastenings. The bronzing of the barrels (which is sometimes done to save the soldier from the fatiguing duty of cleaning it), the staining and polishing of the stock, the insertion of ornamental pieces of brass or any other appendage of a decorative kind, and many minor processes, occupy a considerable number of persons, who work entirely distinct from each other, not only as respects the individual workmen, but also in respect to the factories and workshops; for the 'stocker' and the 'putter-together' and the 'finisher' all ply their respective avocations at their own shops, away from the master-manufacturer, who takes the general designation of 'gun-maker.'

It may appear rather singular that the locks for the muskets are made almost wholly at or near Wolverhampton; but this is only another exemplication of the subdivision-principle, those artisans being able to make their wares best and cheapest who devote their whole attention to the matter. Gun-locks being made of small pieces of iron and steel, their manufacture depends on the use of the hammer, the file, and such like working implements; and indeed their manufacture resolves itself into a finer kind of smiths'-work. The mode of firing off a gun has had a good deal of influence on the construction of the lock. In former times the soldier fired his match-lock or arquebuss by means of a fire-match, and in that state the weapon could hardly be said to have had any lock at all. After that (and indeed until very recent times) the lock afforded very ingenious means for striking a light by means of flint and steel, and directing the spark into the touch-hole. But now, the use of percussion or detonating caps has considerably altered the formation of the lock. These caps are tiny boxes or cells of copper, not so large as a pea, containing a morsel of fulminating mercury, or chlorate of potash, or some other detonating compound. One of these caps is so placed on the lock that a blow causes the mixture to explode, and ignite the powder through the touch-hole.

There is one very curious arrangement sometimes adopted in guns, called *rifling*, or making rifle-barrels, the object of which may be thus explained:—If a bullet be rammed down into a barrel, and the gun fired off, the bullet will be projected straight forward, provided it passes equably through the barrel; but if, as is sometimes the case, it rubs more against one side of the barrel than the other, it will be diverted from its right course, and curve round while passing through the air; so that the marksman misses his aim. To rectify this, the barrels of rifles are grooved spirally on the inside, in order that the bullet, by winding along these grooves in its progress, may acquire a rotatory motion round its own axis, which afterwards prevents it from swerving either to one side or to the other. This rifling is effected by a spiral-cutting instrument, fixed on the end of a rod, to which a peculiar movement is given. The number of grooves in this spiral, the number of turns which each groove makes in its course through the barrel, and the depth of the grooves, are all points determined on differently, according to the opinions of practical men; but the principle is the same in all, viz., that if the bullet can be made to spin round or rotate on its axis while passing through the barrel, it will continue to worm its way through the air with more straightness of path than otherwise will be attained.

It may in conclusion be remarked, that the musket (or rather, the rifle) is the most advanced form of hand-guns, the variety of which in former times was much greater than is generally supposed. The annexed cut will give some idea of the extreme simplicity of some of the contrivances formerly used: it



is taken from a MS. dated about 1468, and exhibits a soldier applying a match to what is in fact, nothing more than a small cannon fixed to the end of a handle. As improvements became gradually introduced, so were new names applied; and thus we find various kinds of hand-guns called arquebusses, haquebuts, calivers, carabines, fusils, musketoons, petronels, fire-locks, and many others. The musket itself is said to have been a Spanish invention, and to have made its first appearance at the battle of Pavia, where it contributed in an especial manner to decide the fortune of the day.



[Chichester Cathedral.]

THE CATHEDRAL OF CHICHESTER.

There is little in the architecture of Chichester Cathedral, and not much in its history, that needs a lengthened notice. The original Cathedral was founded and the building completed towards the close of the eleventh century. In the year 1114 it was greatly injured by fire, and, though soon restored, it was entirely destroyed by a second fire in the year 1186. Bishop Seffrid, who had been appointed to the see about this time, immediately commenced the renovation of the Cathedral. According to some of the historians, he built the church from its foundations; while others say that he "engrafted upon the remaining walls a new work, adapting it to the style and architectural ornaments peculiar to the age in which he lived." Be that as it may, it is agreed that his building is the nucleus of the existing Cathedral; it consisted of the "present nave with its single aisles, the centre arcade with its low tower and transept, and of the choir." It was consecrated by Seffrid on the 13th of September, 1199; but he had not quite completed it at his death in the year 1214. There is little remarkable about it, except that it presents one of the earliest specimens of a stone groined roof: the Cathedral having been twice burnt already, owing chiefly to its wooden roof, Seffrid resolved in his church to prevent, if he could, a similar disaster. Great additions and alterations were made to Seffrid's structure during the next three centuries, and its architecture consequently shows the marks of many periods. The lateral towers belong, at least up to the second tier, to the original church; that facing the south exhibits four elegant examples of early Norman arches; the arches in the third tier are of the tall lancet shape. The central tower was begun by Bishop Neville in the year 1222; the spire was raised about the year 1337—it is nearly three hundred feet high, and bears a considerable resemblance to that of Salisbury Cathedral, though much less graceful. In the interior of the Cathedral may be seen some of the earliest applications of the Sussex, or Petworth, marble, so much used in our ecclesiastical edifices of the "early English" period. We cannot say much for the appearance of Chichester Cathedral; it is indisputably the least handsome of our Cathedrals. The outside is unadorned; and there is nothing in the general form to redeem the inelegance of the details. During the great Revolution it suffered much from the Commonwealth soldiers, and part of its present uncomely appearance may be laid to the charge of their fanaticism and the want of taste displayed in the subsequent restorations. The northern tower, for instance, was so much injured in the siege of 1642, that it fell a few years afterwards, and the present unsightly tower was substituted for it in the year 1791. The ugly western window too is modern, Cromwell's soldiers having entirely destroyed the old one. Nor is the Cathedral fortunate in its site, which is low; and it is surrounded by houses. The entire length of the Cathedral is four hundred and seven feet; of the transepts, one hundred and fifty feet; the nave and aisles are seventy-eight feet wide. The interior is plain. At a short distance from the north-west angle of the Cathedral stands a campanile, or bell-tower, one hundred and twenty feet high. It has four detached turrets at its summit, exactly similar to those at the base of the spire, whence it is thought that it

was built at the same time, to receive the bells from the old tower.

The only noticeable circumstance in the history of Chichester Cathedral is its treatment by the parliamentary soldiers, to which we have just alluded. When the city was taken by Waller, in 1642, some of the troops were quartered in the church, and the devastation they committed was terrible. They threw down the organ and destroyed the screen, stripped the tombs of their brasses and defaced the sculptures, broke down the pulpits, pews, and tabernacle-work, and tore into fragments the Bibles and service-books, scattering their leaves over the church; in addition to which they defaced the carvings both of the interior and exterior of the church, and broke the stained windows. Yet a few years afterwards another party was sent, under the command of Sir Arthur Haslerig, to finish the work of destruction, which it was alleged had been left incomplete; and they did finish it. As we have said, the restorations subsequently made were without the least regard to propriety; but in 1829 the interior was restored to much of its original character. When we were at Chichester a few years back, there was some talk of bringing the exterior to something more of consistency, but we believe nothing has been done yet to that end.

On the walls of the south transept are some remains of two singular pictures painted about the year 1519, for Bishop Sherburne, by Theodore Bernardi, an artist he had invited from Italy for the purpose. They were designed to represent two "principal epochs" in the history of the Cathedral of Chichester—the foundation of the see of Selsey by Caedwalla, and the establishment of his own four prebends—rather unequal epochs, it should seem. These pictures were defaced after the siege, and repaired without much skill after the Restoration: there is little artistic merit in them; whatever value they may possess is antiquarian. There is another by the same hand, which contains a series of portraits of the Bishops of Chichester, and of the Kings of England, from the Conqueror to Henry VII. These have been since brought down to George III. When the interior was repaired some years back, four stone coffins, supposed to be those of bishops, were discovered, in one of which was the skeleton, it is thought, of Stigand, with episcopal robes and insignia, and a large and curious thumb-ring, an agate set in gold. One was the black marble coffin of Bishop Ralph, having his name engraved on it—being one of the oldest with a name existing in England. There are some interesting monuments in the Cathedral. Among others the splendid chantry of St. Richard; the tomb of William Chillingworth, the learned and able defender of Protestantism; Flaxman's monument to the poet Collins, which has been described and represented in No. 459 of one of our previous volumes, and some others. The Lady-Chapel is appropriated to the monuments of the family of the Duke of Richmond; a large vault was constructed under it in the year 1750. Over the entrance to this vault is a stone with the inscription "DOMUS ULTIMA," on which Dr. Clarke, one of the Residentiaries, wrote an epigram that has been classed among the first in our language. It has so much point, that, though often printed, we may quote it as a little relief to our dull details:

"Did he who thus inscribed this wall
Not read, or not believe, Saint Paul,
Who says there is, where'er it stands,
Another house, not built with hands;
Or may we gather from these words,
That house is not a—House of Lords?"

THE CHÂLETS AND PASTURAGES OF THE ALPS.

THE bold and venturous men of science who make long journeyings and even residences among the glaciers of the Alps, have frequent opportunities of seeing the mode of life and the general arrangements adopted by the Alpine herdsmen. These are so remarkable, and so characteristic of the people, that they deserve to be noticed.

An *Alp* is properly a pasture-ground among the mountains: and thus we at once get a clue to the meaning of that name which is now known far and wide. As the mountainous and cold nature of the district is rather inimical to agriculture, except in the valleys, the greater part of the surface which is not bare rock is pasture-land. The wealth of the people, like that of the early inhabitants of Asia, lies to a considerable extent in their cattle, and hence the pastoral life is a marked feature among these mountains. The pasturages are the property either of individuals or of the commune; to a certain extent they are common land, in which the inhabitants of the neighbouring town or village have the right of pasturing a certain number of head of cattle. The system adopted at these pasturages, in respect to the season of the year, is thus described by Mr. Latrobe:—"In the spring, as soon as the snow has disappeared, and the young grass sprouts up, the cattle are sent from the villages up to the first and lower pastures. Should a certain portion of these be exhausted, they change their quarters to another part of the mountain. Here they stay till about the tenth or twelfth of June, when the cattle are driven to the middle ranges of pastures. The herds intended for a summer campaign on the highest Alps remain here till the beginning of July, and on the fourth of that month generally ascend to them; return to the middle range of pastures about seven or eight weeks afterwards; remain there from two to three weeks to eat the after-grass, and finally return into the valley about the tenth or eleventh of October, where they remain in the vicinity of the villages till driven by the snow and tempests of winter into the stables. The cattle, on the other Land, which is not destined to pass the summer on the higher Alps, and are necessary for the supply of the village with milk and butter, descend from the middle pastures on the fourth of July into the valley, and consume the grass upon the pasturage belonging to the commune, till the winter drives them under shelter. The very highest Alpine pasturages are never occupied more than three or four weeks at the furthest."

Sometimes the herdsmen alone go to the pastures with the cattle; but in other instances the owner and the whole of his family migrate for the summer, superintending the herdsmen, and manufacturing butter and cheese on the spot. In some of the pasturages the best cows yield from twenty to forty pounds of milk per day, and two hundredweight of cheese by the end of the season of four months. The *vacher*, or cow-herd, has rather an arduous office; for he has to collect eighty or a hundred cows twice a-day to be milked, to look after stragglers, and to help in the cheese-making processes and in the cleaning of the dairy utensils. The collecting of the cows has given rise to a custom which has furnished a theme for many a ballad, story, or bit of romance: the herdsman uses an 'Alp-horn,' or 'kuh-horn,' the loud and shrill sound of which attracts the cows towards the place of milking and of shelter. In some places the cows are brought in to be milked; while in others a very pretty custom exists of ranging the cows on green-sward

terraces, hundreds in a row, and there milking them. This has given rise to the 'Ranz des Vaches' ('ranging of the cows'), the name of a song or tune peculiarly dear to all the Alpine herdsmen, and introduced by more than one composer as a piquant bit in modern operas.

As these herdsmen live with or near their cows on the elevated pasturages, residences must be provided for them; and these residences afford many picturesque spots in the green expanse where the cattle are seen. The general name of *châlet* is applied to these mountain-huts; for they are no better than huts either within or without, except where the owner goes himself to the pasturage. In one of the valleys there is said to be ten thousand of these châlets. The herdsmen shift their habitation from the lower to the upper pasturages, or vice versâ, as their cattle ascend and descend the Alps at different seasons; and they sometimes have two or three places of temporary abode. Some of the pasturages are even higher up than the glaciers. In one case the cows, for a short time in the summer season, are pastured in such a spot that it excites astonishment in every traveller how they can get there at all. They are transported over a glacier by the following means:—By the aid of hatchets and planks, a sort of rude pathway is constructed the day before the ascent or descent of the cattle is to be performed; and then about thirty peasants assemble to pass as many cows, and by the aid of ropes succeed, usually without any loss, in compelling the poor animals to traverse the rude gangways which have been prepared.

Each châlet consists usually of two buildings, quite distinct, the day and the night apartment; but both of these would somewhat disturb English notions of comfort. The day-room is more properly a manufactory of cheese and butter than a place of ordinary accommodation. The fire is kept up for the purpose of heating the milk, which is done in copper cauldrons, whose size, weight, and bright polish contrast strongly with the want of every ordinary convenience of life. A repetition of copper and other vessels for holding milk and raising cream occupy most of the spare room in the apartment. The floor is of earth and uneven, but not generally dirty. The fire-place is a hole in the ground; the fuel is juniper, or scraps of larch-wood where these can be had; and a sort of moveable wooden crane, from which the copper pot is hung, is one of the most artificial accommodations. There is no chimney, and therefore the fire is usually made near the door; nor are there windows of any description. For light a little fat is used, burned with a wick in a small vessel; but very often the substitute for a lamp or candle is simply a splinter of resinous pine-wood. There is no such thing as a table, unless the top of a chance barrel be admitted as the representative of one; nor are there any chairs except the one-legged milking-stools, and these are rather a tottering substitute.

The absolute want of culinary utensils is no small embarrassment to cold and hungry guests. The only cooking-vessel is sometimes that employed for heating milk, and is besides made of copper; at other times there is an additional one of iron; but except certain wooden skimming-spoons, nearly square, and five or six inches wide in the mouth, there is often no other kind or description of dish, vessel, platter, spoon, or ladle. Where matters are a little better managed, there are a few *écuells*, or wooden bowls.

The sleeping apartment is generally a separate hut, without window, fire, or chimney; built of loose stones or of logs, with a door about three feet high, and the floor being covered with grass. In short the herdsmen seem to display an almost total indifference to the thousand little comforts which with us are deemed so indispensable, and which to a certain extent might be procured without any great increase of expense. But there is one great and absorbing subject for these men's thoughts, which seems to drown every idea of domestic comfort. "Morning, noon, and night, the inhabitants think but of milk; it is their first, last, and only care; they eat exclusively preparations of it; their only companions are the cattle which yield it; money can procure for them *here* no luxuries; they count their wealth by cheeses."

There are, however, many fine points about the character of this primitive people. Mr. Forbes's testimony in their favour is valuable, and should not be overlooked. "I have always received," says this writer, "both in Switzerland and Savoy, a gentle and kind and disinterestedly hospitable reception in the châlets, on the very bounds of civilization, where a night's lodging, however rude, is an inestimable boon to a traveller. These simple people differ very much (it has struck me) from the other inhabitants of the same valleys—their own relatives, who, living in villages during the busy trafficking season of summer, have more worldly ways, more excitement, wider interests, and greater selfishness. The true *pâtre* (pastor or herdsman) of the Alps is one of the simplest and perhaps one of the most honest and trustworthy of human beings. I have often met with touches of character amongst them which have affected me, as I may elsewhere notice; but generally there is an indescribable unity and monotony of idea which fills the minds of these men, who live during all the finest and stirring part of the year in the fastnesses of their sublimest mountains, seeing scarcely any strange faces, and but few familiar ones, and these always the same; living on friendly terms with their dumb herds, so accustomed to privation as to dream of no luxury, and utterly careless of the fate of empires or the change of dynasties. Instead of the busy curiosity about a traveller's motives and objects in undertaking strange journeys, which is more experienced in villages the more remote they be, these simple shepherds never evince surprise, and scarcely seem to have curiosity to gratify. Yet far are they from brutish or uncouth; they show a natural shyness of intermeddling with the concerns of strangers, and a respect for them is testified by their unofficious care in providing and arranging what conveniences they can produce. Their hospitality is neither that of ostentation nor of necessity. They give readily what they have, and do not encumber you with apologies for what they have not.

In one of the châlets which Mr. Forbes was glad to avail himself of in the course of his hazardous rambles, he and his guides had some difficulty in giving to their bedroom any approach to the appearance of a human resting-place. It was a small shed about six feet square and four high, attached to their principal hut, entered by a doorway through which they could with difficulty creep, and which was covered with a piece of cloth as a substitute for a door. Yet even in this situation means were afforded for observing the earnest simplicity and religious feeling of the herdsmen. "As we lay down," says Mr. Forbes, "I was struck by the conduct of Pralong, who knelt down on the hay, and said his prayers shortly and without form or pretension of any kind; and we had not been long composed to rest before we heard a solemn and not unmusical voice proceeding from the neighbouring apartment. On inquiry of Pralong, I found that the practice of evening prayer is kept up amongst the assembled shepherds; a rare but touching solemnity amongst men of the common ranks (for no women live in the higher châlets), separated during so large a part of the year from the means of public worship."



OLD ENGLISH TOMBS, EFFIGIES, AND MONUMENTAL BRASSES.

[Concluded from p. 459.]

It is impossible to determine when monumental brasses were first introduced into England, most of the oldest specimens having doubtless been destroyed; but it was probably during the early part of the reign of Henry III. Jocelyn, Bishop of Wells, who died in 1242, had a brass in Wells Cathedral; William de Berkyng, Abbot of Westminster, who died in 1246, had a brass in the Abbey; Robert Grostete, Bishop of Lincoln, who died in 1253, had a brass in Lincoln Cathedral; and Dean Langton, who died in 1279, had a brass in York Cathedral; but these brasses have all been destroyed. Probably the earliest brass now remaining in England is that of Sir Roger de Trumpington, at Trumpington in the county of Cambridge: he died in 1289.

During the fourteenth century monumental brasses became gradually more and more numerous. In the fifteenth century they were in still greater abundance; but towards the close of the sixteenth century the number began to diminish, and in the reign of James I. the use of them was almost extinct. One of the latest specimens is an exceedingly fine brass, with full-sized effigy of Harsnett, Archbishop of York, who died in 1631: it is at Chigwell in Essex.

The number of brasses which now remain in England, though still considerable, is very small compared to what it has been. Many were destroyed when the monasteries were suppressed in the reign of Henry VIII.; many have been torn up and sold as old metal; but by far the greatest destruction of them took place during the predominance of the gloomy and fanatical Puritans. Some idea may be formed of the extent of this destruction by the following instance of a single church, that of Allhallows, Sudbury. The Journal of William Dowsing, a parliamentary visitor appointed under warrant from the Earl of Manchester to demolish superstitious pictures and monuments in Suffolk during the years 1643 and 1644, states:—"Jan. 9. We brake about twenty superstitious pictures, and took up thirty brazen superstitious inscriptions, ora pro nobis, pray for the soul, &c."

It is remarkable that the later brasses are generally much inferior both in design and execution to the earlier, and as these, with few exceptions, are obviously different in style and workmanship from any specimens known to be by foreign artists, it may be inferred that the art of engraving sepulchral brasses had been practised in England previous to the date of any of those which are now known. One or two are supposed to be French work, and a few are by Flemish artists. To one Flemish artist, several of whose brasses still remain in the churches of Bruges, are ascribed the brass of Adam de Walsokne, 1349, and of Robert Braunche, 1364, both in Lynn church, Norfolk, of Thomas de la Mare, abbot of St. Albans, about 1360, in the abbey of St. Albans, and of Adam Fleming at Newark; all of which are not only remarkable for their large size, but for the variety and spirit of the designs and the elaborate finish of the execution. With these exceptions and a very few others, all the sepulchral brasses now remaining in England appear to be by English artists.

The canopies and other engraved architectural embellishments of monumental brasses are frequently extremely elegant, and the shields of arms, devices, and peculiarities of costume, appropriate each brass to its period in a remarkable manner. Armorial bearings are placed on the pillars and spandrils of the canopies, at the corners and sides of the slabs, and on the dresses. When a female has arms both on her kirtle and mantle, those on the kirtle belong to her own family, those on the mantle to her husband's. Supporters do not occur before the reign of Richard II., who was the first to use them. Coronets round the brows of peers are not found before the reign of Edward III.: John de Valence, his youngest son, who died in 1304, has only a simple fillet; while John of Eltham, his second son, who died in 1334, has a coronet formed of leaves, the earliest that has been met with. Each period has also a form of alphabetic character almost peculiar to itself, which, in the more early brasses, is adhered to with singular uniformity. Some of the more ancient inscriptions in the square-shaped Gothic letters are very handsome, and with a little practice not difficult to read. Roman letters are rarely used on monumental brasses before the reign of Henry VIII., and are generally inelegant enough. The Gothic forms continued to be used occasionally to a late period. The inscriptions are in Latin, French, and English. Most of the early inscriptions are in Latin. French inscriptions occur generally from about 1350 to 1400, but rarely before, and still more rarely afterwards. In the inscriptions after that period English became more common, but Latin continued to be much in use, giving way slowly, nor has it yet been entirely superseded by the vernacular language.

The effigies on monumental brasses, as well as those on table-tombs, are generally represented recumbent on the back, with the hands on the breast placed palm to palm in the attitude of prayer, and this form applies

equally to men and women; but deviations occasionally occur. The head usually rests on a cushion, which is sometimes supported by an angel on each side. Military noblemen are generally in full armour; ecclesiastics in the vestments peculiar to their orders. Ladies have frequently a small dog lying at the feet; men often tread on lions, leopards, or some monstrous heraldic animal.

The Grecian, Roman, and Italian forms of architecture, which had been introduced in the latter part of the reign of Henry VIII., became more and more prevalent during the reigns of Edward VI., Elizabeth, and James I. The columns, capitals, architraves, and other characteristics of classic architecture, are often strangely and monstrously intermixed in the monuments of those times with the Gothic, the glories of which are thenceforward seen no more; and the marble statue, standing, sitting, or reclining, superseded the recumbent effigy.

Monumental brasses are comparatively rare in the north of England: in Wales, one of the most interesting from its association is that of Richard Middleton and his family, at Whitchurch; he was the father of Sir Hugh Middleton. None have hitherto been found in Scotland; and only two in Ireland, which are of late date, in Dublin Cathedral. Brasses, as well as brass effigies, were formerly numerous in France; but nearly all of them were destroyed during the Revolution, when they were converted into coin or cannon. There are many fine brasses still remaining in the churches of Flanders.

Specimens of monumental brasses are easily obtained by the process called *rubbing*. Paper of moderate thickness, tenacity, and softness, is laid upon the brass, and rubbed with a black or coloured material, which adheres to the paper where the brass is solid, leaving the paper, where the brass has been cut away, in its original state, in consequence of its sinking into the incisions, and thus offering no resistance to the rubber. By carefully confining the rubbing to the brass, a perfect fac-simile may thus be obtained. Lead is somewhat too hard to work well as a rubber, as well as too light-coloured. A solid piece of black lead answers very well, but the rubbing is liable to injury by slight friction, if not washed over with some glutinous liquid, such as beer or milk. Shoemakers' heel-ball is the material which has hitherto been found most convenient; it is a composition of tallow, wax, and lamp-black. The operation is easy and clean; by a little care and management, the most delicate lines may be represented; and the rubbing, when completed, will bear any moderate degree of friction without injury. The incised lines of the brass sometimes require to be cleaned out, which in most cases may be done with a stiff brush, or with a blunt etching-needle. Paper of suitable quality, and of the full size of the whole slab, is manufactured on purpose, as well as heel-balls of different degrees of hardness.

A new material for making rubbings has recently been invented, which is composed of a yellow metallic powder mixed with the adhesive substance of which the rubber is composed, in the same manner as the lamp-black is mixed with the wax and tallow. When the rubbing is made on a dark-coloured paper, a fac-simile is obtained which is not easily distinguishable from the original; the figure appears to be the brass itself, and the paper which remains unacted on by the rubber appears to be the stone slab in which the brass is embedded.

If a rubbing of a portion of a brass is wanted, as of an armorial bearing for instance, it may be made with lithographic crayons on lithographic transfer paper, and then transferred to stone or zinc.

The first collection of copies of brasses was made by Sir John Cullum, Craven Ord, and the Rev. Thomas Cole. These copies were made, not by rubbing in the manner just described, but by a rude process somewhat resembling copperplate-printing, which was afterwards worked over by the pen, and was altogether a work of much time and labour. The collection was sold to the late Francis Douce for 42*l.*, and by him was bequeathed to the British Museum, where it is now in the Print-Room.

The brass represented at the head of this article, as well as the one below, are reduced copies from heel-ball rubbings obtained from the originals in the church of Hever, in Kent.

The brass of the schoolmaster of Charles Waldegrave is of small size, one foot high exclusive of the inscription, and of rude workmanship. The inscription is — "Here lyeth William Todde, late scholemaster to Charles Waldegrave, Esquire, who deceased the eleventh day of March, An. Dom. 1565, in whose perpetual memorye this monument was erected by his loving friend William Napper of Ponckenoll, in the countie of Dorsetshire." Hever Castle and the estates belonging to it were purchased by Sir Edward Waldegrave, lord chamberlain of the household to Queen Mary, on the death of Anne of Cleves, who held them previously. On the accession of Elizabeth, Sir Edward Waldegrave was divested of all his employments, and committed to the Tower, where he died in 1561. Charles Waldegrave, above mentioned, was probably his son.

The brass of Sir Thomas Bullen is imbedded in the slab of his stately tomb of dark-coloured marble. The effigy is four feet high, exclusive of the inscription. Sir Thomas is represented in the robes and collar of the order of the Garter, with his head resting on a helmet, and his feet on one of the monsters of heraldry. Sir Thomas Bullen was the father of Anne Boleyn, wife of Henry VIII. and mother of Queen Elizabeth.

Sir Geoffroy Bullen, a rich mercer of London and Lord Mayor in the 37th of Henry VI., 1459, married Anne, eldest sister of Thomas Lord Hoo and Hastings, and by that marriage became grandfather to Sir Thomas Bullen and great-grandfather to Queen Anne Boleyn. Sir Geoffrey purchased the entire estate and manor belonging to Hever Castle, and it continued in the family till the death of Sir Thomas Bullen, two years after the execution of his unfortunate daughter, when Henry VIII. seized the estates in right of his late wife, and afterwards enlarged it by purchases from others of the family. The next possessor was Anne of Cleves, on whom, after her divorce, Henry



settled this and other adjoining manors for life. Hever Castle was her principal place of residence, and she died there in the reign of Queen Mary; the estates were then sold by Commissioners, and purchased, as before stated, by Sir Edward Waldegrave. The manor has since belonged to several families. (See Penny Magazine, 1838, p. 284.)

THE TOKAY DISTRICTS OF HUNGARY.

HUNGARY, a country so far situated out of the general track of commerce as to be very little known to us except through the medium of casual tourists, produces a wine known far and wide for rich and valued qualities. This is *Tokay*. Although Hungary is only a dependency of the Austrian empire, yet the wine of the former is much better known in England and foreign countries generally than that of the latter.

The name of Tokay is derived from that of a small town, insignificant in itself, except as connected with the wine-trade. The town is inhabited by a strangely mixed population—Jews, Armenians, and Greeks, besides various classes of the Hungarians properly so called. Most of these derive their support in some way or other from the wine-trade. There is a range of mountains called Hegyalla, extending from Tokay to a distance of twenty miles along the banks of the the river Bodrog; and on this district the grapes for the Tokay-wine are grown. The hills are composed of basalt and conglomerate, covered with a deep sandy soil. Although these vineyards are noticed by a writer who flourished towards the close of the fifteenth century, yet they had acquired no peculiar fame; and it was not till about the year 1650 that Tokay wines came into vogue, in consequence of the improved method of preparing them from picked and half-dried grapes, which appears to have been then practised for the first time.

Several species of grape, mostly white, are cultivated, and are such as ripen early and yield much saccharine juice. That species called *furmint* or *formant* is deemed the best. When first planted, they are cut down at a knot, within a span from the ground, and the superfluous young shoots are pruned at the same place every spring. In consequence of this repeated pruning, the root swells and often becomes very large; and the plants are distinguished by the appellation of *knob-wines*. In order that the fruit may attain its fullest ripeness, the vintage is delayed as long as possible, seldom commencing till the end of October or the beginning of November; by which time, in favourable seasons, a considerable number of the grapes have become shrivelled and half-dried: these are called *trocken-beeren*, or dry grapes, being chiefly supplied by the above-mentioned species of wine.

MR. PAGET states that there are three kinds of wine made at Tokay—the *Essentz* or *Essence*, the *Ausbruch*, and the *Máslás*; all three names being derived from the modes of producing the wine. From the length of time the grapes hang, a great number of them lose part of their juice, begin to wither, and become exceedingly sweet. These grapes, when gathered, are placed in wooden trays, and sorted one by one with the greatest care, the finest only being selected; those which are too much withered, and those which are unripe, being alike rejected. When it is wished to obtain the Essentz, these selected grapes are placed in a barrel with holes at the bottom, through which all the juice that flows, without any other pressure being applied than their own weight, is allowed to pass off. This constitutes the Essentz or essence of Tokay: it is like the syrups of the south of France, and is set aside by itself; the quantity made is small and very thick, and is considered most precious.

Sometimes the grapes will not yield any of this Essentz, and they are in this case subjected next to the process for producing the *Ausbruch*. This wine seems to have been named from the word 'ausbrechen,' to 'break-out,' in allusion to the mode in which the juice leaves the grape. The fruit is placed in a vat, and gently pressed with the hand or with the naked feet; a small quantity of good must, or of new wine obtained in the ordinary manner, being poured over them to increase the quantity and facilitate its flow. This produce is the *Tokay Ausbruch*, which is allowed to stand twenty-four hours, and then ferment. The fermentation having continued two or three days, and the matters which rise to the surface having been skimmed off, the wine is strained into casks. Lastly comes the produce of the *Máslás*, or inferior wine: a large quantity of less choice wine being poured over the grapes which have undergone one or both of the previous processes, and then pressure in the usual way being applied. From the different modes in which the three kinds are produced, they differ in the proportion of real *trockenbeeren* juice which they contain: the Essentz being pure; and the Ausbruch and Máslás having a portion of this essence combined with a portion of commoner wine; the ratio being sixty-one of essence in eighty-four of Ausbruch; and sixty-one of essence in a hundred and sixty-nine of Máslás.

The fine wine which is generally known as Tokay is the *Ausbruch*, the Essentz being extremely small in quantity, and the *Máslás* inferior in quality. MR. PAGET says:—"The Essentz can only be obtained in the very best years; and indeed it is only in favourable years that Ausbruch of a good quality is produced. The wine ought to have a fine light topaz colour. The Essentz is sweet and luscious to the highest degree, and is esteemed rather as a curiosity than as pleasing to the palate; but it is the Ausbruch on which the reputation of Tokay depends. It is a sweet, rich, but not cloying wine; strong, full-bodied, but mild, bright, and clear; and has a peculiar flavour of most exquisite delicacy. I have never tasted it in perfection but at private tables, and that only twice; I could then have willingly confessed it the finest wine in the world. The *Máslás* is a much thinner wine, rather sweet, with a preponderating flavour of the dried grape."

The whole of the district around Tokay is said to produce about two hundred and fifty thousand *eimers* of wine in a favourable season, an eimer containing about as much as sixteen ordinary wine-bottles;* making in the whole therefore about four million bottles; but of this quantity not more than one-fourth is Ausbruch. In the country where it is produced, the Ausbruch is sold at from four to ten shillings per bottle; and the duty and expenses of transporting it to England are said to be about two shillings more. At Vienna, however, the very finest kind is said to command the high price of a guinea a bottle. Some writers state that the Tokay vineyards belong to

* The 'ohm' of wine in north Germany and the 'eimer' in south Germany are probably the same name in their origin; and some such confusion seems to exist as to their measure as used to exist in the bushel in England. For instance, Mr. Paget speaks of an 'eimer,' as above, of about sixteen bottles; while Mr. Redding gives the produce of the whole of Hungary in 'eimers' of ten gallons each. Before the imperial measures were introduced in England, a hogshead of ale or beer in the country, a hogshead of ale in London, a hogshead of beer in London, and a hogshead of wine, were all different quantities, and all four differed in quantity from a hogshead of water in hydraulic engineering. These discrepancies, and those still larger in respect to the bushel, may prepare us to expect similar sources of confusion in other countries. In money, too, the same is observable; for the 'rouble' in Russia, and the 'groschen' in Germany, are not definite sums unless some other distinctive name be applied to them.

the Emperor; but this applies only to a portion of them.

Although Tokay abounds in saccharine matter, yet, undergoing but an incomplete fermentation, it is sometimes apt to fret and spoil, especially when the produce of wet seasons, and of grapes that have contracted any degree of mouldiness. In this way several casks of Ausbruch, of the vintages of 1789 and 1792, when the autumns proved very rainy, are said to have become completely acid in the course of two or three years, in the emperor's cellars. Such results, however, are rare, and in general Tokay is reckoned a very durable wine. Mr. Paget states that the safe exportation of this wine to England depends a good deal on the honesty of the agent employed. "Two cases," he remarks, "which we intrusted to a merchant of Pesth, arrived in England in a state of fermentation, with more than half the bottles broken, and the rest quite spoiled. We have every reason to believe that this arose from a portion of our wine being taken out, and the bottles filled up with new wine; and though the evidence is not sufficiently strong to justify me in publishing the name of this person, it is more than enough to make me caution any future traveller to be quite sure of his man before he ventures on giving such a commission. A society for 'making known Hungarian wines' has lately been formed at Pesth, and in its cellars genuine wines, supplied by the growers themselves, may be obtained."

There are other Hungarian wines, besides Tokay, of good reputation, though none equal to it. The wine of Buda is red, and was once a favourite wine in England. Another kind called Sexard resembles Bordeaux. Grosswardein and Warwitz are two districts producing esteemed wine; and there are many other parts of the country where wine is produced; some for transport to Vienna or other parts, and some for home consumption, for the Hungarians are rather fond of wine, and generally carry a flask with them when on a journey.

Though the Hungarian peasants, as a body, are rather deficient in care and system, they conduct the wine manufacture with great cleanness. The wine-presses and vats are well cleaned with boiling water in which vine-leaves have been steeped. The fruit is collected in wooden vessels, which are carried by the labourers, and overseers attend to see that no grapes are left on the vines. The different gatherings are collected in vats having a double bottom, the uppermost of which is pierced with holes for the juice to pass through, while the grapes are being beaten and bruised with a stick. When the upper vessel is full its contents are taken to the press. The grapes are generally divided for the red and the white wines, but the bad ones are not rejected: all are pressed together; and the must is thrown into a large vat to ferment. When the grapes are too abundant for the operation of pressing, they are put into sacks and trodden; the contents of the sack being afterwards put by for distillation.

With respect to the ownership of the wine-districts, the vineyards are permitted to be purchased by the peasantry, who are obliged to pay a tenth to the lord of the soil: this is considered a heavy tax upon their industry. The tenure of the better vineyards is of a different kind. The vineyards of the Ausbruch or Tokay districts pay no tenths to the lord of the soil; the tenure of the peasant being in general only the good-will of the lord. Many of the estates are but temporarily occupied about a month before the vintage; the proprietor at other times leaving his house and vineyard to the care of a peasant, for which his wages are increased. The vintage is quite a season of festivities at Tokay; for all the nobility of the neighbourhood meet together, and keep up the holiday with balls and fêtes for nearly a fortnight. When the vintage (which takes place at the latter end of October and the beginning of November) is over, the vine cuttings are taken away, the poles removed, and in some places the vines laid in and covered with earth, all being prepared before the first snow falls upon the ground.

PROTECTIVE AND SANATORY PROVISIONS FOR POPULATED DISTRICTS.

The Metropolitan Buildings Act of last Session may be regarded as an important legislative step for improving the condition of towns. Hitherto large masses of people have been allowed to congregate within the close streets and alleys of our ancient towns and cities, without any regard being paid, by the governing body, to the consequences which such aggregations must produce upon the condition of the persons who form them in particular, and generally upon society at large. At times, indeed, such persons have broken bounds, to seek habitations beyond the limits indicated, but only to exchange fever for ague; for the mustiness of the pent-up close they find the mildew of the undrained suburb. The beauty of the neighbourhood of a town is destroyed by suburban excrescences, whilst the condition of the inhabitants remains unimproved.

London has had its Building Act, in some form or other, ever since the reign of Queen Anne; but these Acts were of a very limited character, being confined to some crude and often oppressive regulations for the prevention, or rather to check the spreading, of fire, and to the removal of ruinous buildings. The last Building Act (Sir Robert Taylor's) was passed about seventy years ago, and, although an improvement on the earlier Acts, it departed little, if at all, from the crudeness with which they are all chargeable. It appointed some certain and many uncertain rules for the construction of buildings: and what effect these have produced may be seen in the perforated brick walls, and slated evasions of walls, which make up the mass of London houses, and render London streets compounds of meanness and insecurity. The administration of the Act was confided to District Surveyors, each Surveyor having independent authority within his own district; if that could be called authority which depended upon the nearest Police Magistrate, who might disallow or enforce, according to his own judgment, what the District Surveyor had deemed it to be within his duty to require. The result has been found, in practice, adverse alike to private interest and to the public good; the requirements of the law, being opposed to common sense, were constantly sought to be evaded alike by architect and by builder; and the evasions were almost of necessity acquiesced in, with more or less of scrupulousness or liberality (whichever term may best apply), by the officers appointed to superintend the execution of the law.

The recent Act provides for the due administration of its technical rules, independently of the police court; and it makes provision for modifying these rules, so that they may not stand in the way of improvement nor be at variance with the real objects of the Act.

The immediate superintendence of buildings in progress is still confided to the District Surveyor, who will refer, in all cases of dispute, difference, or difficulty, to superior officers appointed under the Act by the Secretary of State and by the Commissioners of Woods and Works; and to whom, also, is confided the duty of considering and preparing any required modification of the technical rules. It is understood, also, that these officers are to be engaged in assisting the Government in the preparation of measures of an analogous character which it may be deemed advisable to adopt in conse-

quence of the investigations which have been some time in progress by the Health of Towns Commission.

Besides prescribing rules for building generally, with a view to the protection of the public from the consequences of insecure or easily combustible dwelling-houses, and of the public health, in the drainage and ventilation of dwellings, the Act provides also for the special supervision of such buildings as are intended to be used for public congregation, to secure sufficiency of strength in the parts of structure, having regard to their uses. Painful evidence of the necessity of such supervision, and, indeed, for carrying it beyond what are designated public buildings, presents itself in the recent fatal catastrophe at Oldham (on November 2, 1844); and, from the investigations connected with, and report upon which, it is too clear that the best-meaning persons are not to be trusted to direct the application of their own capital, in such matters as buildings, without some control or restraint. In addition, too, to the provisions for rendering new buildings more secure and more wholesome in themselves, the Metropolitan Buildings Act provides, moreover, that streets and alleys shall not be made of less than certain sufficient widths, for convenience and for light and air to the houses, and that they shall be otherwise so arranged as to secure more perfect general ventilation, whilst the soil-drainage of houses is made imperative; and it is also required, imperatively, that no dwelling-house shall be built in such a situation that the scavengers' cart cannot be brought up to one or other of its fronts. The provision of most immediate operation, however, as it regards the sanatory condition of the poor, is found in section 53, to the effect that close, undrained, and unventilated rooms shall not be used as dwellings after the 1st of July, 1846; and with a view to render this provision really and beneficially operative, the official Referees and the Registrar of Metropolitan Buildings (the superior officers appointed to administer the Act) have already issued forms to the Overseers of the Poor of all the parishes throughout the metropolitan district, in order to assist the parochial authorities in making a return of all rooms within their respective parishes which are deemed by the Legislature to be unfit for dwellings, but which are occupied as such. Such returns will be made use of to produce an improvement of the existing habitations of the poorest classes, and to show to those persons who may be induced to make better provision for the accommodation of the poor, the demand which the relinquishment of many incurably-bad places must establish for humble but wholesome dwellings, within a very short time. This clause, with its schedule, is so important, that we give the substance of both:—It provides, "that from and after the 1st July, 1846, it shall not be lawful to let separately to hire as a dwelling any such room or cellar not constructed according to the rules specified in the Schedule (K)* to this Act annexed, nor to occupy or suffer it to be occupied as such, nor to let, hire, occupy, or suffer to be occupied any such room or cellar built underground for any purpose (except for a wareroom or storeroom); and that if any person wilfully let or suffer to be occupied in manner aforesaid any underground cellar or room, contrary to the provisions of this Act, then, on conviction thereof before two justices of the peace, such person shall be liable to forfeit for every day during which such cellar or room shall be so occupied a sum not exceeding 20s.; and one half of such penalty shall go to the person who shall sue for the same, and the other half to the poor of the parish in which such unlawfully occupied cellar or room shall be situate; and that, on or before January 1, 1845, it shall be the duty of the overseers of the poor, and they are hereby required, to report to the official referees the number and situation of the dwellings within their respective parishes of which any underground room or cellar shall be so occupied, and that thereupon it shall be the duty of the official referees and they are hereby empowered to direct such notice to be given to the owners and occupiers of such dwellings as shall appear to such official referees best calculated to give to such owners or occupiers full knowledge of the existence, nature, and consequences of this enactment; and that it shall be the duty of the district surveyors and they are hereby required to give full effect to the directions of such official referees in this behalf."

Sections 54 and 55 of the Metropolitan Buildings Act provide for the restraint and eventual removal from populated neighbourhoods of trades or businesses which are dangerous, noxious, or offensive; and grant, moreover, to the inhabitants of any locality infested or infected by any such trade or business the important power of enforcing their removal from or abandonment within such locality by purchase at public cost; whilst the law effectually provides for preventing the new establishment of dangerous, noxious, or offensive trades or businesses in any already populated locality.

The removal of sources of danger and of disease, and the improvement of the dwellings themselves of the poor, cannot fail to be beneficial: and the more especially, as it is confidently believed that the latter effect can be produced, not only without increasing the expense, but really at less cost to the people themselves.

* The Schedule enacts that with regard to back yards or open spaces attached to dwelling-houses, every house hereafter built or rebuilt must have an enclosed back yard or open space of at the least one square [a square is defined by the Act to be 100 square feet], exclusive of any building thereon, unless all the rooms of such house can be lighted and ventilated from the street, or from an area of the extent of at the least three-quarters of a square above the level of the second story, into which the owner of the house to be rebuilt is entitled to open windows for every room adjoining thereto. And if any house already built be hereafter rebuilt, then, unless all the rooms of such house can be lighted and ventilated from the street, or from an area of the extent of at the least three-quarters of a square, into which the owner of the house to be rebuilt is entitled to open windows for every room adjoining thereto, there must be above the level of the floor of the third story an open space of at the least three-quarters of a square. And to every building of the first class must be built some roadway, either to it or to the enclosure about it, of such width as will admit to one of its fronts of the access of a scavenger's cart.

With regard to the lowermost rooms of houses, being rooms of which the surface of the floor is more than three feet below the surface of the footway, and to cellars of buildings hereafter to be built or rebuilt, if any such room or cellar be used as a separate dwelling, then the floor thereof must not be below the surface or level of the ground immediately adjoining thereto, unless it have an area, fireplace, and window, and unless it be properly drained. And to every such lowermost room or cellar there must be an area not less than three feet wide in every part, from six inches below the floor of such room or cellar to the surface or level of the ground adjoining to the front, back, or external side thereof, and extending the full length of such side; such area, to the extent of at least five feet long and two feet six inches wide, must be in front of the window, and must be open, or covered only with open iron gratings. And for every such room or cellar there must be an open fireplace, with proper flue therefrom, with a window-opening of at the least nine superficial feet in area, which window-opening must be fitted with glazed sashes, of which at the least four and a half superficial feet must be made to open for ventilation.

With regard to rooms in the roof of any building hereafter built or rebuilt, there must not be more than one floor of such rooms, and such rooms must not be of a less height than seven feet, except the sloping part, if any, of such roof, which sloping part must not begin at less than three feet six inches above the floor, nor extend more than three feet six inches on the ceiling of such room.

With regard to rooms in other parts of the building, every room used as a separate dwelling must be of at the least the height of seven feet from the floor to the ceiling.



[Maximilian the First.]

THE RÖMER AT FRANKFORT.—No. IV.

Maximilian the First was the son of the Emperor Frederic III., and was born at Neustadt, near Vienna, on Maundy Thursday (March 22nd), in the year 1459. Though his father Frederic reigned for half a century, his reign was not a glorious one, and his most successful effort was the procuring of the marriage of his son with Mary, daughter of Charles the Rash, and heiress to the vast dominions of the ducal house of Burgundy, by which means Franche Comté, Alsace, the Netherlands, Artois, in short all her father's territories with the exception of Burgundy Proper, which was annexed to France, were united to the estates of the House of Austria. It was on the occasion of this marriage, A.D. 1447, that Frederic bestowed on his son Maximilian the title of Archduke of Austria, which his successors have borne ever since. Frederic died in 1493, and Maximilian succeeded him in the Austrian dominions as well as on the imperial throne, having been elected King of the Romans in his father's life-time. Indeed, from this time down to the dissolution of the German empire in our own days the imperial dignity may be said to have become hereditary in the House of Austria. The reign of Maximilian was an important one both to Germany and to the Austrian dominions. He consolidated both the power of his house and that of the empire. He was the reformer of the public law of Germany, and the creator of German military discipline, being the first to establish a standing army, with infantry, cavalry, and artillery, divided into regiments and subdivided into companies. He secured the reversion of Hungary and Bohemia to his posterity by a double marriage of the Archduchess Maria, his grand-daughter, with Ludovic, son of Ladislaus, and of Anna, sister of Ludovic, with his grandson Ferdinand. His own son Philip was married to Joanna, heiress of Castile and of Aragon. Maximilian died in 1519, and was succeeded on the imperial throne by his grandson Charles V., under whom the House of Habsburg attained the climax of its glory.

The personal traits of character in Maximilian were marked, and made him popular. He was a bold and adventurous hunter; one of his adventures in the mountains of the Tyrol is thus told in Murray's 'Hand-book of Southern Germany':—"The Emperor Maximilian, led away on one occasion in pursuit of a chamois among the rocks above [the shelf now known as the Martinswand], by ill-luck missed his footing, and rolling headlong to the verge of the precipice, was just able to arrest himself, when on the brink of destruction, by clinging with his head downwards to a ledge of rock, in a spot where he could neither move up nor down, and where to all appearance no one could approach him. He was perceived from below in this perilous position, and as his death was deemed inevitable, prayers were offered up at the foot of the rock by the Abbot of Witlau, as though for a person in *articulo mortis*. The Emperor, finding his strength failing him, had given himself up for lost, and recommended his soul to Heaven, when a loud halloo near at hand arrested his attention. A bold and intrepid hunter named Zips, who had been driven to the mountains to avoid imprisonment for poaching, had, without

knowing what had happened, also been drawn to the spot, in clambering after a chamois. Surprised to find a human being thus suspended between earth and sky, he uttered the cry which attracted Maximilian's attention. Finding the perilous nature of the case, he was in a few minutes at the Emperor's side, and binding on his feet his own crampons, and extending to him his sinewy arm, he succeeded with difficulty in guiding him up the face of the precipice along ledges where to appearance even the chamois could not have found footing, and thus rescued him from a situation of such hopeless peril that the common people even now attribute his escape to the miraculous interposition of an angel. The spot where this occurred, now hollowed out into a cave in the face of the rock, is marked by a crucifix, which, though eighteen feet high, is so far above the high road that it is barely visible from thence. It is now rendered accessible by a steep and rather difficult path, and may be reached in about half an hour's walk from Zirl. The cave is seven hundred and fifty feet above the river, and the precipice is so vertical that a plumb-line might be dropped from it into the high road below. It is traditionally stated that Maximilian rewarded the huntsman with the title of Count Hollooer von Hohenfelsen, in token of his gratitude, and in reference to the exclamation uttered by him which had sounded so welcome to the emperor's ears as announcing that relief was at hand. By the Emperor's pension list, still in existence, it appears that a sum of sixteen florins was annually paid to one Zyps of Zirl." He was also a chivalrous knight, and a lover and patroniser of the arts and literature. One of the most extensive works of Albert Durer is the 'Triumphs of Maximilian;' it is devoted to the events of his life, and his appellation of "theuerdank," one who thinks high things, shows the estimation in which he was held,—perhaps better than a more laboured memorial.

In form he was tall and slender, but well-knit and healthy, and possessing great muscular strength; beautiful yellow hair fell about his face, the marked features of which were softened by an expression of serenity and kindness. During the celebrated Diet of Worms in 1495, a French knight, named Claude du Barre, made his appearance, and challenged the Germans to single combat. As no one would venture to accept the challenge on account of his widely-celebrated strength, Maximilian himself, concealing his name, entered the lists, vanquished the Frenchman after an arduous conflict, and thus saved the honour of the German knighthood. It is immediately after this victory that the artist, Alfred Rethel, has painted the portrait represented above. In joyous pride Maximilian tramples upon the broken spear and the lily-decorated shield of his adversary; the crown of victory in his hand, his cheeks yet glowing from the fatigue of his exertions. The proud and lofty bearing, the decided features, happily express the noble, warlike nature of this emperor. An earnest seriousness is depicted in them; a cheerful serenity joined with a just doubt as to the success of his bold undertakings. In the background of the picture the extent of his dominions, or rather of his pretensions, is shown by the heraldic bearings with which the cloth covering the lists of the tournament is decorated. The eagle of Austria is associated with the lion of Habsburg; the cross of Hungary with the cross-beams of Flanders: and the shields are united by the chain of the order of the Golden Fleece, the symbol of the proud Burgundian dukedom. By a poetical licence a little bit of Tyrolean landscape, perhaps the Martinswand, is also seen beyond the lists of Worms in the painting, which is not shown in our engraving.

THE WINE DISTRICTS OF THE LEVANT.

THE peninsula of Greece, and the islands contiguous to it, have a beauty of climate which fits them for the growth of the grape; and we accordingly find that from the earliest times to the present wine has been made there; though the means scarcely exist for determining whether the system of operations then adopted was analogous to that of modern times.

The island of Cyprus is one of the most distinguished spots in the Levant for its wines. The vines are there cultivated on hills covered with stones or flints, and with a blackish earth mixed with ochreous veins. The vines, according to Mr. Redding's account, are planted in equidistant rows in the rainy season, or about November. Young vines are in some spots planted in trenches three feet deep, in which thyme-plants grow, or have been planted to shelter them in the wet season, and to preserve the earth about them. The plants are put into the ground with a ladder-shaped instrument of two staves, to receive the foot that forces it down. The plant is sunk to the depth of about eighteen inches; a little water is poured in on the root, and the opening is filled up. In some instances no trench is made except a hollow round the plant, excavated to prevent the grapes from touching the ground and rotting, and which is further beneficial by retaining water or moisture. No trees are allowed near the vines, and the surface is well weeded. The vines grow thick in the stem, but are not more than three feet high. They are pruned in February and March; two shoots are left in each plant, and two buds on each shoot; or if three shoots are left, only one bud is reserved on each. No props are used, but the vines are allowed to hang down, in order that they may receive the heat reflected from the surface of the ground, as well as the direct heat of the sun. A few grapes only are borne on each plant, but these are plump and fine: they hang by long stems, and are of a rich purple colour, with a reddish green pulp.

The gathering of these grapes, and the preparation of them for the wine-manufacture, are carefully conducted. The vintage lasts six weeks, commencing about the third week in August; the grapes for the inferior kinds of wine being gathered first. When collected, the grapes are placed on covered floors called *punsi*, and spread out with care to the depth of eighteen inches, where they remain till the seeds begin to drop from them. They are then taken up in shovels and carried into rooms paved with marble or covered with a cement equally hard and durable, inclined a little to one side. They are there bruised with a flat mallet, and squeezed three or four times under small presses called *pattiri*; the thick expressed juice flowing into a vessel placed at the lower side of the floor, which, as it fills, is emptied into small vases, and conveyed into baked earthen vessels shaped something like the *amphoræ* of the ancients.

Then commences the process of converting this expressed juice into wine. The conical vessels are half buried in the earth; and the wine is left to ferment in them about six weeks. At the expiration of this period, the vessels are shut up close with covers of baked earth, and the wine is observed to be much lighter in colour than before. These fermenting vessels are of curious formation. As soon as they come from the potter's furnace the vessels are coated internally, either with pitch, or with a boiling liquid composed of turpentine and pitch, mixed with vine-ashes, goats'-hair, and fine sand: this coating effectually closes the pores of the earthenware and neutralizes its bibulous qualities.

There is a district in Cyprus which once belonged to the Commendaria or Commandery of the Knights

Templars and the Knights of Malta, and which produces wine of high excellence; and though the system is swept away which gave rise to the name, yet the wine of this district is still called the wine of the Commandery. These Commandery wines are made in August and September, from grapes of a red colour. As soon as it is made, it is put into earthen vessels such as have just been described; and after being kept in these for a year, its hue is found to be changed from red to yellowish. It fines itself by age, so that at eight or ten years old it is nearly of the same hue as the sweet wines of southern Europe. The dregs deposited in it are very thick, and are supposed to facilitate the fining. When the wine is brought from the country into the towns it is placed in casks containing dregs, where it remains another year.

Mr. Redding states that one very remarkable circumstance attached to the wine of Cyprus is the value of the lees, they are always exported with the wine if possible. Before bottling, a month or two of rest must be given to the cask, that they may subside. They settle with greater difficulty abroad than in their native island. The cask must be pierced above the dregs, and the wine will come off limpid, but this should only be done for bottling. The wine deposits no tartar on the cask, but the dregs or lees are sometimes a mixture in colour of black, red, and yellow, of the consistence of paste, but generally of the hue of Spanish snuff. The wine being poured upon them, they rise, clarify it, and subside. Casks with the lees sell for four times the price of those without, and hence wines that are adulterated by colouring, or with any other object, do not produce lees, and lose their strength.

The wine of Cyprus is sold at the vineyards by the load, consisting of sixteen jars, holding about five Florence bottles each. There is a curious regulation whereby the vender must warrant the wine until the middle of August next following the vintage, whether it remains in his own possession or in that of the buyer: if not found good at the end of this time, it is returned; if the contrary, it is deemed a satisfactory proof of its goodness.

The Commandery wines are said to average about ten thousand jars each vintage. The Venetians have for a long time been large purchasers of this wine; and it is also exported to other parts of Italy, and to Holland and France. The exported wines are generally less than ten years old; and those retained for home consumption are seldom kept to the age of twenty years. The wines of an inferior quality produced in the island are generally drunk by the inhabitants. The best of them bear some resemblance to Provence wine, and they grow yellow by age; but, from the way in which they are prepared, they imbibe a very unpleasant pitchy flavour. There is a very sweet wine also made in the island, which is at first nearly white, but acquires a redness and body by age.

The arrangements in the other islands of the Archipelago are more or less analogous to those observable in Cyprus. Dr. Henderson remarks, "Throughout nearly the whole of Greece the soil is highly favourable to the vine. On the Continent the extensive ranges of mountains which intersect the country are chiefly calcareous. In those islands which have been celebrated for their general fertility and the superiority of their wines, as Scio, Tenedos, Candia, Zante, &c., similar strata occur; in others, where the growths are of equal repute, as Lesbos, Naxos, and Santorini (the Thera of the ancients), the rocks are of volcanic origin. The variety of climate and choice exposures, which the elevated grounds present, serves to diversify to an infinite degree the quality of the wines obtained."

The general character of the processes adopted in the Greek islands is described to be as follows:—The vines are cut near the root and allowed to extend their branches laterally; and the general management of the growth is such as might ensure a good vintage. But the vintage processes are far in arrear as respects care and cleanliness. The grapes for the most part are gathered indiscriminately and thrown into an open cistern, where they are exposed to the full influence of the atmosphere; and, as they are often half-dried before they are trodden, a quantity of water is added to them, in order to facilitate the fermentation. Salt, baked gypsum, and lime are used, to correct the sweetness of the liquid; and a portion of resin is commonly introduced, to imitate the pungency of old wine. In some places the product of the fermentation is collected in skins smeared with tar, which impart a disagreeable flavour, and render it unfit for use until it has been mellowed by long keeping; but the poverty of the farmers will seldom allow them to adopt the proper means for preserving their wines. Hence it happens that the lighter growths often turn entirely acid in the course of a few months after the vintage; and only the stronger kinds will keep beyond the year. In those situations, however, which have been favoured by commerce, and where subterraneous cellars have been formed, wines of considerable age may be occasionally met with.

The arrangements for the vintage among the peasants of the islands, in the time of Tournefort, are thus described by that traveller:—"Every private man has in his vineyard a sort of cistern, of what dimensions he thinks fit; it is made square, well walled, and cemented with brick-mortar, open at top. In this they stamp the grapes, after letting them lie two or three days to dry; as fast as the must runs out at a certain hole of communication into a basin placed below the cistern, they pour it into leathern budgets and carry it to tun, where they empty it into casks of wood, or large earthern jars, buried up to the neck in the ground. In these vessels the new wine works as it may: they throw into it three or four handfuls of white lime-plaster, with the addition, now and then, of a fourth part of fresh or salt water. After the lime has sufficiently worked, they stop up the vessels with plaster." He describes the wine-making system of Scio, one of these islands, as commencing with the drying of the grapes in the sun for seven or eight days. "After this they press them, and then let them stand in tubs to work, the cellar being all the while close shut. When they would make the best wine, they mix among the black grapes a sort of white one, which smells like a peach-kernel; but in preparing nectar, so called even to this day, they make use of another kind of grape, somewhat styptic, which renders it difficult to swallow."

* *Estates in India.*—The whole face of India is parcelled out into estates of villages. The village communities are composed of those who hold and cultivate the land, the established village servants, priest, blacksmith, carpenter, accountant, washerman, basket-maker (whose wife is *ex officio* the midwife of the little village community), potter, watchman, barber, shoemaker, &c. To these may be added the little banker, or agricultural capitalist, the shopkeeper, the brazier, the confectioner, the ironmonger, the weaver, the dyer, the astronomer or astrologer, who points out to the people the lucky day for every earthly undertaking and the prescribed time for all religious ceremonies and observances. In some villages the whole of the lands are parcelled out among cultivating proprietors, and are liable to eternal subdivision by the law of inheritance which gives to each son the same share. In others, the whole of the lands are parcelled out among cultivators, who hold them on a specific lease for limited periods, from a proprietor who holds the whole collectively under government, at a rate of rent fixed either permanently or for limited periods.—*Recollections of India by Lt.-Col. Sleeman.*



[Procession of the Skimmington.]

HUDIBRAS.—No. IX.

The Second Canto of the Second Part most strikingly and ingeniously satirises the practice, of which all parties at the period of the Poem accused each other, and indeed with too much reason, of equivocation, and which Butler most unsparingly attributes alike to the Presbyterians and the Independents; while they, as is well known, recriminated—accusing, if not convicting, even the Sovereign of adopting the convenient doctrine of Hudibras, that

> "He that imposes an oath makes it,
> Not he that for convenience takes it,"

as exemplified in his negotiations with them: and churchmen and dissenters alike agreeing in condemning the Roman Catholics, particularly the Jesuits, for its constant practice.

The thoughts of the promised infliction of the whipping had scarcely suffered the Knight to sleep; but at length, when

> "The sun had long since in the lap
> Of Thetis taken out his nap,
> When, like a lobster boil'd, the morn
> From black to red began to turn,"

Hudibras rubs his eyes, leaves his couch, and commences a long discussion with the Squire as to the means of satisfactorily evading the castigation. Although the Squire appears willing to assist his master in devising tricks to break his oath, the reasons of the two are most ingeniously varied. They are in fact both disputants against the generally received opinions of the world. And the poet observes, in beginning the Canto—

> "'Tis strange how some men's tempers suit
> (Like bawd and brandy) with dispute,
> That for their own opinions stand fast
> Only to have them claw'd and canvast,
> That keep their consciences in cases,
> As fiddlers do their crowds and bases;
> Ne'er to be us'd but when they 're bent
> To play a fit for argument:
> Make true and false, unjust and just,
> Of no use but to be discust;
> Dispute and set a paradox,
> Like a strait boot upon the stocks,
> And stretch it more unmercifully
> Than Helmont, Montaigne, White, or Lully.
> So th' ancient Stoics in their porch,
> With fierce dispute maintain'd their church,
> Beat out their brains in fight and study,
> To prove that virtue is a body;
> That Bonum is an animal
> Made good with stout polemic brawl:
> In which, some hundreds on the place
> Were slain outright, and many a face

Retrench'd of nose, and eyes, and beard,
To maintain what their sect averr'd.
All which the Knight and Squire in wrath
Had like t' have suffer'd for their faith,
Each striving to make good his own,
As by the sequel shall be shown."

In his 'Characters,' where he was not, as in his Poem, led to give any tone of party feeling, Butler has given a more general description of the 'Disputant,' which it may not be uninteresting to compare:—

"A disputant is a holder of arguments, and wagers too, when he cannot make them good. He takes naturally to controversy, like fishes in India that are said to have worms in their heads, and swim always against the stream. The greatest mastery of his art consists in turning and winding the state of the question, by which means he can easily defeat whatsoever has been said by his adversary, though excellently to the purpose, like a bowler that knocks away the jack when he sees another man's bowl he nearer to it than his own. Another of his faculties is with a multitude of words to render what he says so difficult to be recollected, that his adversary may not easily know what he means, and consequently not understand what to answer, to which he secretly reserves an advantage to reply by interpreting what he said before otherwise than he at first intended it, according as he finds it serve his purpose to evade whatsoever shall be objected. Next to this, to pretend not to understand, or misinterprets, what his antagonist says, though plain enough, only to divert him from the purpose, and to take occasion from his exposition of what he said to start new cavils off the bye, and run quite away from the question. but when he finds himself pressed home and beaten from all his guards, to amuse the foe with some senseless distinction, like a falsified blow, that never hits where 'tis aimed, but while it is minded makes way for some other trick that may pass. But that which renders him invincible is abundance of confidence and words, which are his offensive and defensive arms; for a brazen face is a natural helmet or beaver, and he that has store of words needs not surrender for want of ammunition—no matter for reason and sense, that go for no more in disputations than the justice of a cause does in war, which is understood but by few, and commonly regarded by none. For the custom of disputants is not so much to destroy one another's reason, as to cavil at the manner of expressing it, right or wrong; for they believe *Dolus an Virtus*, &c.[2] ought to be allowed in controversy as war, and he that gets the victory on any terms whatsoever, deserves it, and gets it honourably. He and his opponent are like two false lute strings, that will never stand in tune to one another; or like two tennis-players, whose greatest skill consists in avoiding one another's strokes."

The dispute of the Knight and the Squire extends to nearly five hundred lines, the conclusion which is come to being that a lie or a substitute may be justifiably used. But when, in imitation of Don Quixote and Sancho, Hudibras desires Ralpho to be the substitute, he flatly refuses, and as the Knight threatens to compel him, the Squire commences to draw his sword, when they are alarmed by a sudden noise, which causes them to pause awhile:—

"And now the cause of all their fear
By slow degrees approach'd so near,
They might distinguish diff'rent noise
Of horns, and pans, and dogs, and boys,
And kettle-drums, whose sullen dub
Sounds like the hooping of a tub.
But when the sight appear'd in view,
They found it was an antique show;
A triumph, that for pomp and state
Did proudest Romans emulate:
For as the aldermen of Rome
Their foes all taming overcome,
And not enlarging territory,
(As some mistaken write in story)
Being mounted in their best array,
Upon a car, and who but they?
And follow'd with a world of tall-lads,
That merry ditties troll'd, and ballads,
Did ride with many a Good-morrow,
Crying, Hey for our town through the borough,
So when this triumph drew so nigh,
They might particulars descry,
They never saw two things so pat,
In all respects, as this and that.
First, he that led the cavalcade,
Wore a sow-gelder's flageolet,
On which he blew as strong a levet,
As well-feed lawyer on his breviate;
When over one another's heads
They charge (three ranks at once) like Swedes.
Next pans, and kettles of all keys,
From trebles down to double base
And after them, upon a nag,
That might pass for a forehand stag,
A cornet rode, and on his staff
A smock display'd did proudly wave:
Then bagpipes of the loudest drones,
With snuffling broken-winded tones,



[Escape of Hudibras and Ralpho.]

Whose blasts of air in pockets shut,
Sound filthier than from the gut,
And made a viler noise than swine
In windy weather when they whine.
Next one upon a pair of panniers,
Full fraught with that which for good manners
Shall here be nameless, mixt with grains,
Which he dispens'd amongst the swains,
And busily upon the crowd
At random round about bestow'd.
Then mounted on a horned horse,
One bore a gauntlet and gilt spurs,
Ty'd to the pummel of a long sword
He held reversi, the point turn'd downward.
Next after, on a raw-bon'd steed,
The conqu'ror's standard-bearer rid,
And bore aloft before the champion
A petticoat display'd, and rampant;
Near whom the Amazon triumphant
Bestrid the beast, and on the rump on't
Sat face to tail, and bum to bum,
The warrior whilom overcome;
Arm'd with a spindle and a distaff,
Which as he rode she made him twist off:
And when he loiter'd, o'er her shoulder
Chastis'd the reformado soldier.
Before the dame, and round about,
March'd whifflers, and staffiers on foot,
With lackeys, grooms, valets and pages,
In fit and proper equipages;
Of whom, some torches bore, some links,
Before the proud visago-minx,
That was both Madam and a Don,
Like Nero's Sporus, or Pope Joan;
And at fit periods the whole rout
Set up their throats with clam'rous shout.
The Knight transported, and the Squire,
Put up their weapons and their ire;
And Hudibras, who us'd to ponder,
On such sights, with judicious wonder,
Could hold no longer to impart
His animadversions, for his heart."

As in the case of the bear-baiting, Hudibras declares the procession to be heathenish, antichristian, ethnick, idolatrous, and derogatory to the female sex, and determines, notwithstanding the exhortations and explanations of Ralph, to put it down. Trusting, as usual, more to his eloquence than his arms, he proceeds, as then, to address the assemblage,—and dilating particularly on the partisan services of the women in the civil wars, with similar success to that which attended his former efforts. Another part of the ceremony, adopted as a Lynch-law punishment for dominating wives, consisted in sweeping before the doors of those who were suspected of being in the same category, and is alluded to by Sir W. Scott in his 'Fortunes of Nigel.' Our artist has admirably represented both the mock solemnity of the procession and the accompaniments of the escape.

"At that an egg let fly
Hit him directly o'er the eye,
And running down his cheek, besmear'd
With orange-tawny slime his beard;
But beard and slime being of one hue,
The wound the less appear'd in view.
Then he that on the panniers rode
Let fly on th' other side a load;
And quickly charg'd again, gave fully
In Ralpho's face another volley.
The knight was startled with the smell,
And for his sword began to feel:
And Ralpho, smother'd with the stink,
Grasp'd his; when one that bore a link,
O' th' sudden clapp'd his flaming cudgel,
Like linstock, to the horse's touch-hole;
And straight another with his flambeaux
Gave Ralpho's o'er the eyes a damn'd blow.
The beasts began to kick and fling,
And forc'd the rout to make a ring;
Thro' which they quickly broke their way,
And brought them off from further fray.
And though disorder'd in retreat,
Each of them stoutly kept his seat:
For quitting both their swords and reins,
They grasp'd with all their strength the manes,
And to avoid the foe's pursuit,
With spurring put their cattle to 't;
And till all four were out of wind,
And danger too, ne'er look'd behind."

On recovering their breath they do not resume their quarrel, but Hudibras wrests the occurrence into an omen of good fortune, and concludes—

"Vespasian being daub'd with dirt,
Was destin'd to the empire for 't;
And from a scavenger did come
To be a mighty prince in Rome:
And why may not this foul address
Presage in love the same success?
Then let us straight, to cleanse our wounds,
Advance in quest of nearest ponds;
And after (as we first design'd)
Swear I've perform'd what she enjoin'd."

CHANGES IN THE OCCUPATIONS OF THE PEOPLE.

IN no one respect is the contrast as to what may be called the external circumstances of the people so great between past and present times as in the variety of the modes pursued in each in order to obtain the means of subsistence. Some facts in illustration of this point may not be uninteresting, and the causes which have led to the great increase in the number of occupations may at the same time be briefly indicated.

The population of England at the Conquest is supposed to have been about two millions, and this would give about six persons to one hundred acres of land, or thirty-eight to each square mile, which is about the proportion that now prevails in the state of Pennsylvania. England was then, however, comparatively an old country. A thousand years had elapsed since the Romans had first landed on its shores; but large tracts of country were still in a state of nature and required to be drained and cleared; and for several centuries to come the strong hand and the stout arm of an increasing agricultural population were needed to accomplish this great task.

Coming down to a period five centuries after the Conquest, we have a tolerably exact estimate of the population of England, which, in 1570, nearly the middle of the reign of Elizabeth, may be set down at 3,737,000. This gives about eleven persons to every one hundred acres of land. England, with its cities and towns, and its thousands of hamlets, had at this time exactly the same proportion of population per square mile (74) as Westmoreland, the most thinly peopled of all our counties at the present day.

Two centuries later, in 1750, the population had increased to 6,000,000, being 120 to a square mile, or about eighteen persons to every one hundred acres. In 1750 the whole of England had about the same proportion of population per square mile as we now find in Cumberland, which, next to Westmoreland, is the most thinly populated of our counties. Lincolnshire, which contains a larger proportion of persons engaged in agriculture than any other county, has 139 persons to a square mile. This purely agricultural district would probably have had no larger a population than it contained three centuries ago, if the industry of its inhabitants had not been stimulated by the constant and increasing demand for its productions in the markets of Lancashire, Yorkshire, and London.

So long as a great proportion of the people produced

chiefly for their own consumption, and there was consequently little exchange of productions, the population continued scanty.

In 1841 the population of England was 14,995,138. This, in very nearly an addition of nine millions (8,929,097) since 1750; and of above eleven millions (11,257,297) since 1570. For the first five hundred years after the Conquest the increase of population was less than two millions; and for the one hundred and eighty years preceding 1750 the addition to its numbers was about 2,230,000, or less than the increase from 1821 to 1841, which was 2,733,699. The density of population has increased successively from about 38 per square mile at the period of the Norman Conquest to 74 per square mile in 1570; and from 120 in 1750 to 298 in 1841. In the great manufacturing county of Lancaster the population in 1841 was 944 per square mile, and in the West Riding of Yorkshire 448; being 147 persons to every one hundred acres in Lancashire, and 70 in the West Riding. Including all the waste lands, the number of persons to each hundred acres in England is 63.

This remarkable progress in the density of the population has been accompanied by changes of still higher interest in connection with the circumstances and condition of the people, more particularly as respects the nature of their occupations. First we have a period in which the country possessed no articles of export except its natural productions and raw materials—its tin, lead, wool, hides, and grain. A trade of this kind does not admit of any great division of labour. The nature of the home market was more likely to encourage diversity of occupations; but then the number of persons engaged in each could not well be numerous while the producers were also to a considerable extent the consumers of the products which called forth their industry. The flax which a man grew on his own land was spun and woven into clothing by his own family for household use rather than for sale. The produce of his flock was in like manner converted into good rough warm clothing by household industry for family use; and this was the position of the population generally. If the factories of Manchester or Leeds could have sprung up by magic they could not have produced a fabric so cheap as that which employed only time that would otherwise have been spent idly and unproductively. A half-agricultural half-manufacturing population cannot venture to abandon before its proper time the spinning and weaving of linen and woollen for household use, and it would be no less hazardous for a household to apply its whole energies to the spinning-wheel and the loom. The facilities for readily exchanging the products of the soil for linens and woollens are as yet too limited to encourage the separation of the two branches of employment. It is a slow and gradual change by which a whole people can be made to exchange as well as to produce and consume, and so long as the family union of agricultural and manufacturing industry exists there can be no great home market, and traffic is necessarily carried on on a confined scale. Separate the two industries, and its activity is necessarily increased. The occupier of land must then enter the market as a buyer of cloth, and the weaver must do the same in order to obtain corn or flour. The principle of exchange, the essential element of commerce, when once brought into pretty full operation, will more or less rapidly produce changes of the greatest importance. The necessity of going to market and of a man selling all that he produces in order to buy all that he uses, is a stimulus which is felt in the improvement both of agriculture and manufactures, and raises them from the rude state in which they had previously existed. The land is better cultivated, and its increased productiveness is capable of supporting a larger number of non-agricultural consumers, and again the increase of their number still further aids the progress of agriculture, and fresh land is brought under the plough. When these mutually beneficial agencies once obtain their full play, the nation rapidly advances in prosperity.

The next stage in this progressive course is the result of greater freedom of industry, the improvement of roads, the construction of canals, the facilities afforded by banks for the employment of capital, and improved machinery. But it is when a vast export trade is opened in addition to the supply of the home market that the character of the national industry contrasts most strikingly with its condition when manufactures were in their cradle. The system of exchanges is now complete, and men no longer produce for their own consumption, but supply their wants by the exchange of industry for industry. In England at the present time, as Mr. Laing remarks, in his 'Notes of a Traveller,' everything that man uses sets a-going three industries. "Every pound weight of wool or cotton twist, every yard of cloth, sets in motion, first, an industry or capital to grow it or bring it home from the grower; secondly, an industry or capital to manufacture it for use and to bring it to market for sale; and thirdly, an industry or capital to earn the means, by producing and selling its own products, to buy it for wearing apparel." This state of things is not without its accompanying evil. When a great part of the population is detached from the soil and is no longer in the self-producing and self-consuming state, its welfare depends upon the power of exchanging the products of its industry. If this exchange cannot be effected, destitution is the consequence.

The movement of the national industry towards its present condition seems emphatically to have commenced about the middle of the sixteenth century, that is, three hundred years ago. At that period the corporate towns vainly attempted to preserve their old privileges, and to repress the industry of the villages and hamlets in their vicinity. Vainly also did the legislature at the same time exert themselves to prevent the breaking up of the old social system under which the population mainly lived by agriculture. It has taken three centuries to establish the preponderance in numbers of the classes engaged in trade, commerce, and manufactures. Whether the relative proportion of this class to those employed in agriculture will go on still augmenting, depends in a great degree upon the extension of foreign trade.

If we had a census of the occupations of the people of England three or four centuries ago, with the number of persons engaged in each, it would be not a little curious to contrast it with that taken in 1841. The number of different trades in existence was, we know, very small. About the middle of the fourteenth century the trades exercised in Colchester, then considered the tenth town in England in point of numbers, were the following:—Baker, barber, blacksmith, bowyer, brewer, butcher, carpenter, caster, cobbler, cook, dyer, fisherman, fuller, furrier, girdler, glass seller, glover, linen-draper, mercer and spice-seller, miller, mustard and vinegar seller, old clothes seller, saddler, tailor, tanner, tiler, weaver, wood-cutter, and wool-comber. In 1841 the number of occupations returned in the same borough, though no longer retaining its relative rank but by the increase of other places having become a fourth-rate town, was one hundred and forty-one instead of thirty. In 1377 Edward III. increased the number of trades which had the right of electing members of the common council of the city of London from thirty-two to forty-eight, and though this might not include all the occupations then carried on, those which were excluded were not of much import-

ance. The number of different occupations in London, in 1841, was 751, and in Great Britain 877. In the reign of Elizabeth the number of working persons of both sexes and all ages would be about one million and a half, and they were unaided by the wonderful creations and combinations of mechanical and natural science which are enjoyed by the seven millions of working persons returned in 1841 as being engaged in one or other sort of industry.

OLD ENGLAND NOVELETS.

The design of this series of little novels, which are to form a part of 'Knight's Weekly Volume for all Readers,' is thus explained by the Editor:—"The writers of the 'Old England Novelets' will be content with the endeavour to bring out, illustrate, and render interesting the facts which make up 'The History of the People.' In this spirit, one author may attempt the working out of some plain occurrence of common life, so as to show the dependence even of the humblest upon the course of public events, and far more upon the upholding of just principles of social intercourse. Another may select the more inviting task of seizing upon the romantic incidents and feelings of past times—

'Dreams that the soul of youth engage
Ere fancy has been quelled;
Old Legends of the monkish page,
Traditions of the saint and sage,
Tales that have the time of age,
And Chronicles of eld.'—Longfellow.

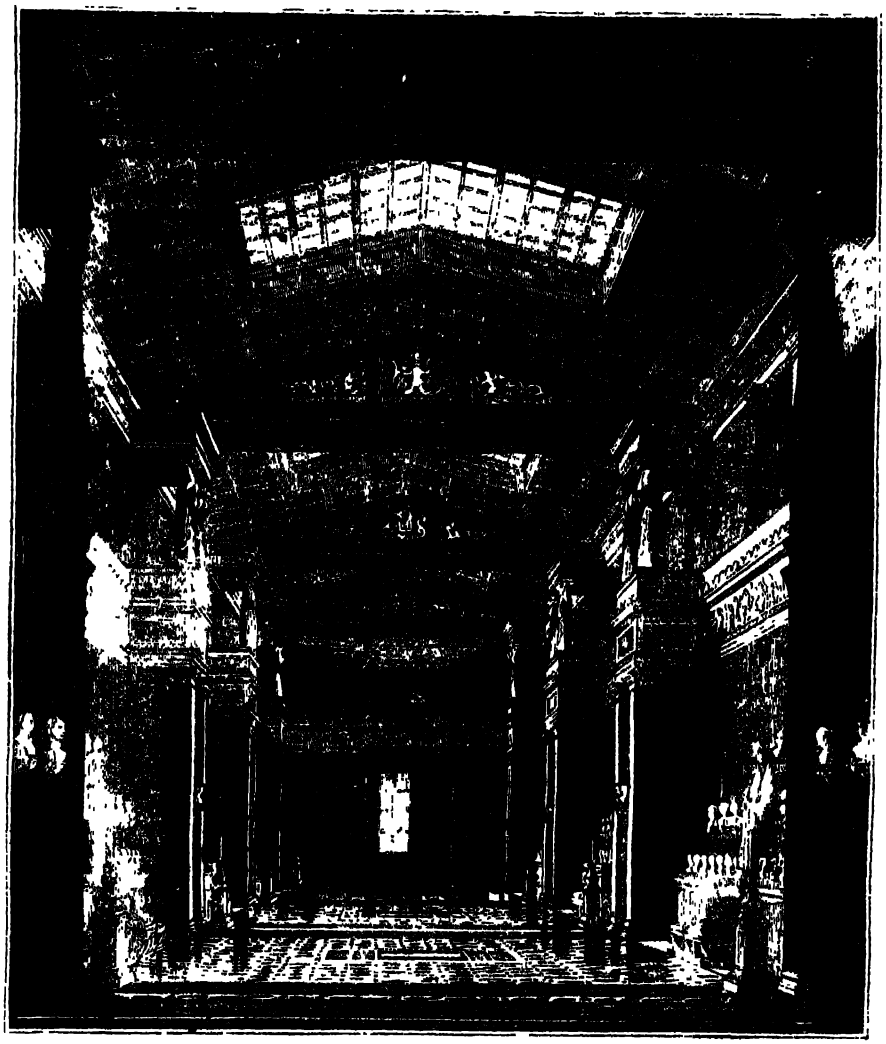
But in whatever path the author walks, they will have one purpose—to advance the love of our country, and to assert the principles of benevolence and toleration, binding all ranks together in one feeling of common kindness and courtesy, which are more than ever essential to uphold and preserve 'Old England.'"

The first novelet is entitled 'The Camp of Refuge,' and the period of the story commences four years after the battle of Hastings. The writer has assumed, to a certain extent, "the character of one writing a legendary narrative about a century after the Norman conquest."

The Camp of Refuge is in the isle of Ely, which was then surrounded by fens and marshes. Hither resorted the Saxons who were most impatient of the Norman yoke, or who had been ousted from their lands by the followers of the Conqueror. The state of this part of the country is thus described:—

"We, the monks of Ely that now live (*Henrico Secundo regnante*), have witnessed sundry great changes in the Fen Country, and more changes be now contemplated; in sort that, in some future age men may find it hard to conceive, from that which they see in their day, the manner of country the Fen-country was when the Normans first came among us. Then, I wis, the isle of Ely was to all intents an inland island, being surrounded on every side by lakes, meres, and broad rivers, which became still broader in the season of rain, there being few artificial embankments to confine them, and few or no droves or cuts to carry off the increase of water towards the Wash and the sea. The isle had its name from Helig or Elig, a British name for the willow, which grew in great abundance in every part of it, and which formed in many parts low but almost impenetrable forests, with marshes and quagmires under them, or within them. Within the compass of the waters, which marked the limits of the country, and isolated it from the neighbouring countries—which also from south to north, for the length of well nigh one hundred miles, and from east to west, for the breadth of well nigh forty miles, were a succession of inland islands, formed like Ely itself—were numerous meres, marshes, rivers, and brooks. The whole isle was almost a dead flat, with here and there an inconsiderable eminence standing up from it. These heights were often surrounded by water; and when the autumnal or the spring rains swelled the meres and streams, and covered the flats, they formed so many detached islets. Though surrounded and isolated, they were never covered by water; therefore it was upon these heights and knolls that men in all times had built their towns, and their churches or temples. Communications were kept up by means of boats, carricks, and skerries, and of flat-bottomed boats which could float in shallow water; and, save in the beds of the rivers, and in some of the meres, the waters were but shallow even in the season of rains. But if it was a miry, it was not altogether a hungry land. When the waters subsided, the greenest and richest pasture sprung up in many parts of the plain, and gave sustenance to innumerable herds. The alluvial soil was almost everywhere rich and productive; and the patches which had been drained and secured rewarded the industry and ingenuity of the inhabitants with abundant crops. The Roman conquerors, with amazing difficulty, had driven one of their military roads through the heart of the country; but this noble causeway was an undeviating straight line, without any branches or cross-roads springing from it; and it was so flanked in nearly its whole extent by meres, pools, rivers, rivulets, swamps, and willow forests, that a movement to the one side or the other was almost unpracticable, unless the Romans, or those who succeeded the conquerors in the use of the causeway, embarked in boats and travelled like the natives of the country. In all times it had been a land of refuge against invaders. In the days of Rome the ancient Britons rallied here, and made a good stand after all the rest of England had been subdued. Again, when Rome was falling fast to ruin, and the legions of the empire had left the Britons to take care of themselves, that people assembled here in great numbers to resist the fierce Saxon invaders. Again, when the Saxons were assailed by the Danes and Norwegians, and the whole host of Scandinavian rovers and pirates, the inhabitants of the isle of Ely, after enjoying a long exemption from the havoc of war and invasion, defied the bloody Dane, and maintained a long contest with him; and now, as at earlier periods, and as at a later date, the isle of Ely became a place of Refuge to many of the people of the upland country, and of other and more open parts of England, where it had not been found possible to resist the Danish battle-axes. The traditions of the ancient Britons had passed away with that unhappy and extinct race; but the whole fenny country was full of Saxon traditions, and stories of the days of trouble when war raged over the isle, and the fierce Danes found their way up the rivers, which opened upon the sea, into the very heart of the country. The saints and martyrs of the district were chiefly brave Saxons who had fought the Danes in many battles, and who had fallen at last under the swords of the unconverted heathen. The miracles that were wrought in the land of many waters were for the most part wrought at the tombs of these Saxon warriors. The legends of patriotism were blended with the legends and rites of religion. Every church had its patriot saint and martyr; in every religious house the monks related the prowess, and chanted daily requiems, and said frequent masses to the soul of some great Saxon warrior who had fallen in battle; or to some fair Saxon maid or matron, who had preferred torture and death to a union with a pagan; or to some Saxon queen or princess, who, long before the coming of the Danes, and at the first preaching of the gospel among the Saxons by Saint Augustine and his blessed followers, had renounced a throne and all the grandeurs and pleasures of the world, and all her riches (*relictis fortunis omnibus!*), to devote herself to the service of heaven, to found a monastery, and to be herself the first lady abbess of the monastery she founded."

The Saxon hero of the tale is Hereward of Brunn, and he has a noble follower in Elfric his sword-bearer. Long years after Hereward had "made his peace" with the Conqueror, Hereward thus addresses Elfric: "Elfric," said Lord Hereward, "the great stream of our old Saxon blood is fast absorbing the less stream of Norman blood, and so will it continue to do. The children of Normans, being born in England and suckled by Saxon nurses, will cease to be Normans. All men love to keep that which they have gotten, and as our old Saxon laws are far more free than those of France, and give more security for life and goods, and oppose a stronger barrier to the tyranny of princes, the Normans that now live among us, or their sons that shall succeed them, will, for their own sakes, cling to our old laws, and help the chiefs and the great body of the English people to make the spirit of them to be enduring in the land."



[Interior of the Valhalla.]

THE VALHALLA.

In our previous volumes, Nos. 274 and 692, we have given an account of this noble building, and in No. 274 a representation which shows its form and elevation. We now give a view of the interior, and complete the account by a detail of the artistical decoration, which in fact forms the real object of the building—a monument to the fame of Germany.

The Valhalla forms externally a magnificent Doric octastyle peripteral temple, with its principal front facing the south. It is entirely constructed of white marble, and is of nearly the same dimensions as the Parthenon, being one hundred and four by two hundred and twenty five feet; the columns and entablature forty-five feet high, and the pediment twelve: making, with the substructure, a total height of one hundred and ninety-five feet. In beauty of material and execution it may fairly be allowed to rival its original, and it gives a complete idea of what the Parthenon itself must have appeared in its perfect state; for it exhibits not merely the semblance of Grecian architecture, but its characteristic grandeur of construction, the blocks of marble being of extraordinary dimensions, and those forming the architraves about eighteen feet in length. All the details, including antifixæ and acroteria are most carefully studied and beautifully finished; and yet there is one species of decoration peculiar to the order which has been omitted, there being no sculpture in the metopes of the frieze. The reason for such omission however is sufficiently apparent, because, owing to the situation of the building, sculpture would have been entirely lost, except as giving a general expression of richness: for seen from below it would not have been distinguishable, and viewed near would have been seen so very near and so immediately from beneath, and would have been so greatly foreshortened, as to be unintelligible. Still there is a most magnificent display of sculpture, and in a truly classical taste, in the two pediments, after designs by Rauch, remodelled and executed by Schwanthaler. That of the south pediment consists of fifteen figures in full relief, the one in the centre, of colossal size and seated, representing Germania, and the others symbolical of the different Germanic states. The sculpture of the other pediment, which is entirely the work of Schwanthaler, consists of the same number of figures, representing the victory obtained by the Cherusci over the Romans.

The interior of the Valhalla is of most striking splendour—most sumptuous in point of decoration

and highly original in its design, which exhibits great happiness of invention. Here Klenze shows himself not an imitator of the ancients, but their rival—their pupil, but also a master in his art. It consists chiefly of a single hall (one hundred and fifty by fifty-seven feet), with a space at its north end, but separated from it only by a screen of Ionic columns, which order is continued throughout in the antæ at the angles of the massive piers which divide the hall into three compartments. The entire length of the interior therefore becomes one hundred and seventy-five feet, and though there was nothing to prevent the whole being laid into one uninterrupted space, the division serves to give the idea of greater extent, and greatly enhances the perspective effect. The same may be said with regard to the piers, whose boldly projecting masses break up what would else have been the too great monotony of the plan, and produce a pleasing succession of parts. Besides being of essential service in supporting the roof, these projections act in some measure as screens, and prevent the disagreeable formality that would attend the ranges of so many busts all of the same size, on each side, if they were all exposed to view at the same time. We have described the construction of the roof in No. 692. The ceiling is of dazzling splendour, being almost entirely lined with plates of gilt bronzes, and with gold stars, and other ornaments on an azure ground in its coffers. Through this the light is admitted from a skylight or opening over each compartment of the plan, which follows the form of the roof, and is filled with sheets of plate-glass framed in bronze. Thus the whole is most effectively and beautifully lighted within, without either windows in the walls or lanterns on the roof.

With what has thus far been described all the other decorations of the interior are in a corresponding style of magnificence, and all of the most costly workmanship and material—white and coloured marbles, bronze, gilding, polychromy, and sculpture. The floor is inlaid with coloured marbles from Tegernsee, distributed into three larger compartments answering to those of the plan. The shafts of the antæ and columns are of a brownish red marble, resembling the antique African, and their bases and capitals of white marble, picked out with colours and gilding; while the walls are lined with the same material, and of nearly the same hue as the columns. In the entablature the architrave and cornice are white, relieved by gold and colours on their mouldings; but the frieze, which is of unusual depth, is entirely of white marble, and forms, except where interrupted by the piers, and where that part is decorated with small pannels of sculpture, a continuous bas-relief, representing the progress of civilization in Germany, from the earliest times to the introduction of Christianity by St. Bonifacius. This piece of sculpture, which extends altogether to two hundred and thirty feet, was composed by Wagner and executed by Pettrich and Schöpf. The three pediments seen on entering are ornamented with subjects taken from the earliest Scandinavian mythology, composed by the painter Lindenschmidt and Professor Stuhlmair, and executed in metal, partly gilt and partly plain.

Besides this principal Ionic order, which is twenty-eight feet and a half high, there is a second one (seventeen feet and a half high) of colossal caryatides, representing Valkyriæ, the female genii in Scandinavian mythology, whose office it was to welcome the souls of the blessed into the halls of Odin and the Valhalla. Of these figures there are two over each pier, which is not carried up solid higher than the first order, so that they stand detached from the walls, and thereby give an air of lightness to the upper part of the interior. These statues, of which there are altogether fourteen, six on each side and two over the columns at the farther end, were executed by Schwanthaler, and are of marble, but slightly polychromed, after the chryso-elephantine fashion of the ancients, in imitation of the natural colours, or, as the Heralds would say, 'proper.' This order, which may also in some degree be termed Ionic, inasmuch as the figures bear voluted capitals on their heads, is raised upon a podium of greyish marble and the frieze of its entablature is ornamented with wreaths of gilded bronze upon an azure ground.

Imperfect as it is, this description of the architectural decorations has detained us so long, that we may seem to have overlooked the principal objects of all—the very works for which the structure was erected as a repository, namely, the effigies of the illustrious persons here commemorated. In regard to mere busts being adopted, instead of statues, as would seem more befitting so sumptuous a Pantheon, it may be observed that, besides the impossibility of having anything like the same number of statues in the same space, one great inconvenience has been thereby got rid of, namely, that which would have attended the strange variety of costume: for while that of the older periods would have been more or less imaginary, that of more recent times would frequently have been found utterly unsuitable for sculpture, and would have formed a most grotesque contrast with the edifice itself; whereas the busts all partake of the same classical character, and are in perfect keeping with the architecture. They are also skilfully arranged, so as to show that they are not mere decorations, and at the same time they do not appear too much crowded, being confined to two rows, the lower one of which is placed upon a continued pedestal of beautiful yellow marble, the others on consoles; and, as presiding over the respective groups of busts, there is within each of the six recesses a smaller winged Valkyria, or genius; also antique marble seats and marble candelabra.

The memorials are partly tablets and partly busts, and many blanks are yet left to be filled up by posterity. Some of the names as claimed by the Germans, will excite the surprise of Englishmen; such are the Venerable Bede and Alcuin: and some of the omissions, such as Huss, Luther, and Zwinglius, will not give a high idea of theological liberality, though Ulrich von Hutten, a reformer, finds a place, as do also the Swiss patriots. The list is curious, though long. The dates are those of the death, but do not always agree with our chronology. Beginning over the entrance, the following TABLETS run in two rows right round the hall in chronological order:—

Hermann, the conqueror of the Romans, 21.
Marobod, chief of the Marcomanni, 40.
Velleda, prophetess, 65.
Claudius Civilis, General of the Batavians, 100.
Hermanmich, King of the Ostrogoths, 375.
Ulphilas, Bishop, before 380.
Friedigel, leader of the Visigoths, 380.
Alaric, King of the Visigoths, 410.
Ataulph, ditto, 415.
Theodoric, ditto, 451.
Horsa, conqueror of Britain, 451.
Genseric, King of the Vandals, 477.
Hengist, conqueror of Britain, 480.
Odoacer, King of the Heruli and Gepidæ, 497.
Klodwig (Lodovic), King of France, 511.
Theoderic the Great, King of the Ostrogoths, 526.
Totila, ditto, 552.
Alboin, King of the Longobards, 573.
Theutelinde, Queen of ditto, 626.
Emeran, the Saint, 680. [Palace of Neustria, 714.
Pepin von Heristall, Duke of Austrasia, Mayor of the
Bede, the Venerable, Abbot and historian, 735.
Wilibrod, the Saint, first Bishop of Utrecht, 739.
Charles Martel, Duke and Prince of France, 741.

Boniface, the Saint, Archbishop of Mainz, 755.
Pepin the Short, King of France, 768.
Witikind, Leader of the Saxons, 800.
Paul Warnefried, historian, 800.
Alcuin, Abbot and scholar, 804.
Egbert, first King of England, 810.
Charles the Great, Emperor, 814.
Eginhard, historian, 839.
Rhabanus Maurus, Bishop and scholar, 856.
Arnulph, Emperor, 900.
Alfred the Great, King of England, 900.
Otto the Illustrious, Duke of Saxony, 912.
Arnulph I., Duke of Bavaria, 937.
Mächthildis, the Saint, Queen of Germany, 968.
Roswitha, poetess, 1000.
Bernward, the Saint, Bishop of Hildesheim, 1022
Hereward, the Saint, Archbishop of Cologne, 1028.
Henry III., Emperor, 1056.
Lambrecht von Aschaffenburg, historian, 1077.
Otto, the Saint, Bishop of Bamberg, 1139.
Otto, Bishop of Freysing, historian, 1158.
Hildegard, the Saint, Abbess, 1179.
Otto the Great, of Wittelsbach, 1183.
Engelbert, the Saint, Archbishop of Cologne, 1225.
The poet of the Nibelungen Lied.
Walter von der Vogelweide, minnesinger (poet), 1230.
Elizabeth, the Saint, Landgravine of Thuringia, 1231.
Leopold VII., the Glorious, Duke of Austria, 1231.
H. von Salza, Grand Master of the Teutonic Order, 1240.
Wolfram von Eschenbach, minnesinger, 1521.
The architect of Cologne Cathedral.
Arnold von Thurn, founder of the Rhenish union, 1261.
Albertus Magnus, Bishop of Ratisbon, 1280.
Walter Furst, Werner Stauffacher, Arnold von Melchthal, the three men of the Ruth.
Frederic the Handsome, of Austria, 1330.
Bruno von Warendorp, Hanseatic leader, 1369.
Arnold von Winkelried of Unterwalden, 1386.
William of Cologne, painter, 1388.
Hadrian von Bubenberg, defender of Murtens, 1479.
Peter Henlein, inventor of watches, 1540.

The Busts are the following:—

Henry the Fowler, King of Germany, 936.
Otto the Great, Emperor, 973.
Conrad the Salic, Emperor, 1039.
Frederic I., Barbarossa, 1190.
Henry the Lion, Duke of Saxony and Bavaria, 1195.
Frederic II., Emperor, 1250.
Rudolph von Habsburg, Emperor of Germany, 1291.
Edwin von Steinbach, architect, 1318.
John Guttenberg, inventor of printing, 1467-8.
John van Eyk, painter, 1745.
Frederic the Victorious, Elector of the Palatinate, 1476.
John Muller (Regiomontanus), scholar, 1476.
Nicholas von der Flue, hermit, 1487.
Eberhard the Bearded, Duke of Wurtemberg, 1455.
Hans Hemling, painter, 1500.
John van Dalberg, Bishop of Worms, 1503.
Hans von Hallwyl, conqueror of Burgundy, 1504.
Berthold von Henneburg, Elector of Mainz, 1504.
Maximilian I., Emperor, 1519.
John von Reuchlin, scholar, 1522.
Francis von Sikingen, Knight, 1523.
Ulrich von Hutten, poet and scholar, 1523.
Albert Durer, artist, 1528.
George von Freundsberg, Field-marshal, 1528.
Peter Vischer the elder, founder in bronze, 1530.
Walter von Plettenberg, Grand Master of Livonia, 1535.
Erasmus von Rotterdam, scholar, 1536.
Theophrastus von Hohenheim, physician, 1541.
Nicholas Copernicus, astronomer, 1543.
J. Turmayr (Aventinus), historian, 1554.
Hans Holbein the younger, painter, 1554.
Charles V., Emperor, 1558.
Christopher, Duke of Wurtemberg, 1568.
Ægidius Tschudi, historian, 1572.
William, Prince of Orange, founder of the Netherland Republic, 1584.
Augustus I., Elector of Saxony, 1586.
Jul. Echter von Mespelbrunn, Bishop of Wurzburg, 1617.
Maurice, Prince of Orange, 1625.
John Kepler, astronomer, 1630.
Albert von Wallenstein, Duke of Friedland, 1634.
Bernard, Duke of Saxe-Weimar, 1639.
Peter Paul Rubens, painter, 1640.
Anthony van Dyk, painter, 1641
Hugo Grotius, scholar and statesman, 1645.
Maximilian, Count of Trautmannsdorf, statesman, 1650
Maximilian I., Elector of Bavaria, 1651.
Amalia, Landgravine of Hesse, 1652
M. Harpertson Tromp, admiral of Holland, 1653.
Paris Lodron, Archbishop of Salzburg, 1653.
Francis Snyders, animal painter, 1657.
Charles X., King of Sweden, 1660.
J. P. von Schonborn, Elector of Mainz, 1673.
Ernest the Pious, Duke of Saxe-Gotha, 1675.
M. H. Ruyter, admiral of Holland, 1676
Otto von Guericke, inventor of the air-pump, 1681.
Frederic William, the great Elector of Brandenburg, 1688.
Charles V., Duke of Lorraine, 1690.
William III., King of Great Britain, 1702
Ludwig, Margrave of Baden-Baden, Field-marshal, 1707.
G. W. F. von Leibnitz, philosopher and statesman, 1716.
Hermann Boerhaave, physician, 1732
Count Maurice von Saxe, Marshal of France, 1750.
G. F. Handel, musician, 1753.
Count von Zinzendorf, founder of Moravians, 1760.
Count von Münich, Russian Field-marshal, 1767.
J. Winckelmann, antiquarian, 1768.
Count of Schaumburg-Lippe, General in Portugal, 1777.
A. von Haller, physician and poet, 1777.
A. R. Mengs, painter, 1779
Maria Theresa, Empress, 1780.
G. G. Lessing, scholar and poet, 1781.
Frederic I., King of Prussia, 1786.
C. R. von Gluck, musician, 1787.
G. E. F. von Loudon, Austrian Field-marshal, 1790.
J. C. W. A. Mozart, musician, 1791.
Ferdinand, Duke of Brunswick, General, 1792.
Justus Möser, advocatus patriæ, 1794.
G. A. Burger, poet, 1794
Catherine II., Empress of Russia, 1796.
F. G. Klopstock, religious poet, 1803.
William Heinse, scholar, 1803
J. G. von Herder, scholar, 1803
Immanuel Kant, philosopher, 1804.
F. von Schiller, poet, 1805.
J. Haydn, musician, 1809.
J. von Muller, historian, 1809.
C. M. Wieland, poet, 1813.
G. D. von Scharnhorst Prussian Field-marshal, 1818.
G. L. von Blucher, ditto, 1819.
Charles, Prince of Schwartzenberg, Field-marshal, 1820.
Wm. Herschel, astronomer, 1822.
Count Diebitsch Sabalkanski, Russian Field-marshal, 1831.
H. F. K. von Stein, Prussian minister, 1831.
A. W. Count von Gneisenau, Prussian Field-marshal, 1831.
J. W. von Gothe, poet, 1832.

The whole arrangement is eminently tasteful, full of contrast and variety, without the slightest confusion. Equal study has been bestowed on every part and every circumstance: so far too is the Walhalla from being a mere restoration or copy of the Parthenon, or designed merely according to ancient precedent, that the interior is a perfectly fresh architectural conception, faithful to the spirit of Grecian art, and giving us not merely its forms, but its essence and its poetry. No other edifice of modern times is so intensely Grecian, or so highly elaborated as a monument of art. A truly monumental fabric it certainly is, being so constructed that it may be pronounced imperishable: as such therefore it will hand down the memory of its founder and architect to a distant posterity, which, with the names of Pericles and Phidias, will place those of Ludwig of Bavaria and Leo von Klenze.



[St. Michael overcoming the Dragon]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXXIV.

RAPHAEL—*continued.*

THE fame of Raphael had by this time spread to other countries. Horace Walpole, in the 'Anecdotes of Painting,' assures us that Henry VIII., who on coming to the throne was desirous of emulating Francis I. as a patron of art, invited Raphael to his court: but he does not say on what authority he states this as a fact. At all events, the young king was obliged to content himself with the little St. George sent to him by the Duke of Urbino, as a specimen of Raphael's talent; and with Holbein, whom he soon after engaged in his service, as his court painter,—perhaps the best substitute for Raphael in point of original genius then to be obtained by offers of gold or patronage. Francis I. was also most anxious to attract Raphael to his court, and not succeeding, he desired to have a picture by his hand, leaving him the choice of subject. As Raphael had chosen St. George as the fittest subject for the King of England, he now, with equal propriety and taste, chose St. Michael, the patron saint of the most celebrated military order in France, as likely to be the most acceptable subject for the French king, and represented the archangel as victorious over the Spirit of Evil. The figures are as large as life: St. Michael, beaming with angelic beauty and power, stands with one foot on the Evil One and raises his lance to thrust him down to the deep. Satan is so represented that very little of his hideous and prostrate form is visible, the grand victorious spirit filling the whole canvas and the eye of the spectator. The king expressed his satisfaction in a right royal and graceful fashion, and rewarded the artist munificently. Raphael, considering himself overpaid, and not to be outdone in generosity, sent to the king his famous Holy Family (called 'The large Holy Family,' because the figures are life-size), in which the infant Christ is seen in act to spring from the cradle into his mother's arms, while angels scatter flowers from above. Engravings and copies without number exist of this famous picture: the original is in the gallery of the Louvre. Raphael sent also his St. Margaret overcoming the Dragon, a compliment apparently to the king's favourite sister, Margaret, queen of Navarre. all these are in the Louvre. When they were placed before Francis I. he ordered his treasurer to count out 24,000 livres (about 3000*l.* according to the present value of money) and sent it to the painter with the strongest expressions of his approbation. At a later period he purchased the beautiful portrait of Joanna of Arragon, vice-queen of Naples, which is also in the Louvre.

About the same period (that is, between 1517 and 1520) Raphael painted for the convent of St. Sixtus at Piacenza one of the grandest and most celebrated of all his works, called, from its original destination, the Madonna di San Sisto. It represents the Virgin standing in a majestic attitude, the infant Saviour *enthroned* in her arms; and around her head a glory of innumerable cherubs melting into light. Kneeling before her we see on one side St. Sixtus, on the other St. Barbara, and beneath her feet two heavenly cherubs gaze up in adoration. In execution, as in design, this is probably the most perfect picture in the world. It is painted throughout by Raphael's own hand, and as no sketch or study of any part of it was even known to exist, and as the execution must have been, from the thinness and delicacy of the colours, wonderfully rapid, it is supposed that he painted it at once on the canvas—a *creation* rather than a picture. In the beginning of the last century the Elector of Saxony, Augustus III., purchased this picture from the monks of the convent for the sum of 60,000 florins (about 6000*l.*), and it now forms the chief boast and ornament of the Dresden Gallery. The finest engraving is that of Frederic Müller, good impressions of which are worth twenty or thirty guineas; but there is also a very beautiful and faithful lithograph by Hofstängel, which may be purchased for half as many shillings.

For his patron Agostino Chigi he painted in fresco the history of Cupid and Psyche. The palace which belonged to the Chigi family is now the Villa Farnesina, on the walls of which this famous fresco may still be seen in very good preservation. In Grüner's admirable work on the 'Decoration of the Palaces and Churches in Italy' there is a perspective view of the corridor of the Farnesina, showing how this beautiful series of compositions is arranged on the ceiling and walls.

During the last ten years of his life the fame of Raphael was very much extended by means of the engraver Marc Antonio Raimondi, who, after studying design in the school of Francia at Bologna, betook himself to Rome, and gained the admiration and goodwill of Raphael by the perfect engravings he made from some of his beautiful works. Marc Antonio lived for some time in Raphael's own house, and engraved for him and under his direction most of those precious and exquisite compositions, the most wonderful creations of the mind of Raphael, of which there exist no finished pictures, and in some cases no drawings nor memoranda:—among these may be mentioned a few which are to be found in the Print-room of the British Museum:—1. The Lucretia, a single figure, wonderfully beautiful. 2. The Massacre of the Innocents. 3. Eve presenting to Adam the forbidden fruit.

4. The Last Supper. 5. The Mater Dolorosa, the Virgin lamenting over the dead body of our Saviour. 6. Another of the same subject, containing several figures. These are only a few of the most precious, for within the present limits it is impossible to go into detail. Some time after the death of Raphael, Marc Antonio was very deservedly banished from Rome by Clement VII. Tempted by gold, he had lent his unrivalled skill to shameful purposes. According to Malvasia, he was afterwards assassinated at Bologna.

The last great picture which Raphael undertook, and which at the time of his death was not quite completed, was the Transfiguration of our Saviour on Mount Tabor. This picture is divided into two parts. The lower part contains a crowd of figures, and is full of passion, energy, action. In the centre is the demoniac boy, convulsed and struggling in the arms of his father. Two women, kneeling, implore assistance, others are seen crying aloud and stretching out their arms for aid. In the disciples of Jesus we see exhibited in various shades of expression, astonishment, horror, sympathy, profound thought. One among them, with a benign and youthful countenance, looks compassionately on the father, plainly intimating that he can give no help. The upper part of the picture represents Mount Tabor: the three apostles lie prostrate, dazzled, on the earth, above them, transfigured in glory, floats the divine form of the Saviour with Moses and Elias on either side. "The twofold action contained in this picture, to which shallow critics have taken exception, is explained historically and satisfactorily merely by the fact that the incident of the possessed boy occurred in the absence of Christ, but it explains itself in a still higher sense, when we consider the deeper universal meaning of the picture. For this purpose it is not even necessary to consult the books of the New Testament for the explanation of the particular incidents: the lower portion represents the calamities and miseries of human life, the rule of demoniac power, the weakness even of the faithful when unassisted, and directs them to look on high for aid and strength in adversity. Above, in the brightness of divine bliss, undisturbed by the sufferings of the lower world, we behold the source of consolation and redemption from evil."

At this time the lovers of painting at Rome were divided in opinion as to the relative merits of Michael Angelo and Raphael, and formed two great parties, that of Raphael being by far the most numerous.

Michael Angelo, with characteristic haughtiness, disdained any open rivalry with Raphael, and put forward the Venetian, Sebastian del Piombo, as no unworthy competitor of the great Roman painter. Raphael bowed before Michael Angelo, and with the modesty and candour which belonged to his character, was heard to thank heaven that he had been born in the same age and enabled to profit by the grand creations of that sublime genius: but he was by no means inclined to yield any supremacy to Sebastian; he knew his own strength too well. To decide the controversy the Cardinal Giulio de' Medici, afterwards Pope Clement VII., commissioned Raphael to paint his picture of the Transfiguration, and at the same time commanded from Sebastian del Piombo the Raising of Lazarus, which is now in our National Gallery (No. 1): both pictures were intended by the cardinal for his cathedral at Narbonne, he having lately been created Archbishop of Narbonne by Francis I. Michael Angelo, well aware that Sebastian was a far better colourist than designer, furnished him with the cartoon for his picture, and, it is said, drew some of the figures (that of Lazarus for example) with his own hand on the panel; but he was so far from doing this secretly, that Raphael heard of it and exclaimed joyfully, "Michael Angelo has graciously favoured me, in that he has deemed me worthy to compete with himself and not with Sebastian." But he did not live to enjoy the triumph of his acknowledged superiority, dying before he had finished his picture, which received the last touches from the hand of Giulio Romano.

During the last years of his life, and while engaged in painting the Transfiguration, Raphael's active mind was employed on many other things. He had been appointed by the pope to superintend the building of St. Peter's, and he prepared the architectural plans for that vast undertaking. He was most active and zealous in carrying out the pope's project for disinterring and preserving the remains of art which lay buried beneath the ruins of ancient Rome. A letter is yet extant addressed by Raphael to Pope Leo X., in which he lays down a systematic, well-considered plan for excavating by degrees the whole of the ancient city; and a writer of that time has left a Latin epigram to this purpose:—that Raphael had sought and found in Rome "*another Rome:*" "To seek it," adds the poet, "was worthy of a great man—to reveal it, worthy of a god." He made several drawings and models for sculpture, particularly for a statue of Jonah, now in the church of Santa Maria del Popolo. Nor was this all;—with a princely magnificence he had sent artists at his own cost to various parts of Italy and into Greece to make drawings from those remains of antiquity which his numerous and important avocations prevented him from visiting himself. He was in close intimacy and correspondence with most of the celebrated men of his time, interested himself in all that was going forward, mingled in society, lived in splendour, and was always ready to assist generously his own family, and the pupils who had gathered round him. The Cardinal Bibbiena offered him his niece in marriage, with a dowry of 3000 gold crowns, but the early death of Maria di Bibbiena prevented this union, for which it appears that Raphael himself had no great inclination.



(Charity.)

In possession of all that ambition could desire—for him the cup of life was still running over with love, hope, power, glory—when, in the very prime of manhood and in the midst of vast undertakings, he was seized with a violent fever, caught, it is said, in superintending some subterranean excavations, and expired after an illness of fourteen days. His death took place on Good Friday (his birthday), 1520, having completed his thirty-seventh year. Great was the grief of all classes; unspeakable that of his friends and scholars. The pope had sent every day to inquire after his health, adding the most kind and cheering messages, and when told that the beloved and admired painter was no more, he broke out into lamentations on his own and the world's loss. The body was laid on a bed of state, and above it was suspended the last work of that divine hand, the glorious Transfiguration. From his own house near St. Peter's a multitude of all ranks followed the bier in sad procession, and his remains were laid in the church of the Pantheon, near those of his betrothed bride, Maria de Bibbiena, in a spot chosen by himself during his lifetime.

Twelve years ago, in the year 1833, there arose among the antiquarians of Rome a keen dispute concerning a human skull which, on no evidence whatever, except a long-received tradition, had been preserved and exhibited in the Academy of St. Luke as the skull of Raphael. Some even expressed a doubt as to the exact place of his sepulchre, though upon this point the contemporary testimony seemed to leave no room for uncertainty. To ascertain the fact, permission was obtained from the papal government, and from the canons of the church of the Rotunda (*i. e.* of the Pantheon), to make some researches; and on the 14th of September in the same year, after five days spent in removing the pavement in several places, the remains of Raphael were discovered in a vault behind the high altar, and certified as his by indisputable proofs. After being examined, and a cast made from the skull and from the right hand, the skeleton was exhibited publicly in a glass case, and multitudes thronged to the church to look upon it. On the 18th of October, 1833, a second funeral ceremony took place. The remains were deposited in a pine-wood coffin, then in a marble sarcophagus, presented by the pope (Gregory XVI.), and reverently consigned to their former resting-place, in presence of more than three thousand spectators, including almost all the artists, the officers of government, and other persons of the highest rank in Rome.

Besides his grand compositions from the Old and New Testament and his frescoes and arabesques in the Vatican, Raphael has left about one hundred and twenty pictures of the Virgin and Child, all various—only resembling each other in the peculiar type of chaste and maternal loveliness which he has given to the Virgin, and the infantine beauty of the Child. The most celebrated of his Madonnas, in the order in which they were painted, are:—1. The Madonna di Foligno, in the Vatican. 2. The Madonna of the Fish, at Madrid. 3. The Madonna del Cardellino, at Florence. 4. The Madonna di San Sisto, at Dresden. 5. The Madonna called the Pearl, at Madrid. Eight of his Madonna pictures are in England, in private galleries.

There are but few pictures taken from mythology and profane history, the Cupid and Psyche and the Galatea being the most important, but a vast number of drawings and compositions, some of them of consummate beauty.

He painted about eighty portraits, of which the most famous are Julius II.; Leo X. (the originals of both these are at Florence): Cardinal Bibbiena; Cardinal Bembo; and Count Castiglione (the last at Paris): the Youth with his Violin, at Rome; Bindo Altoviti, supposed for a long time to be his own portrait, now at Munich; the beautiful Joanna of Arragon, in the Louvre; the portrait called the Fornarina, supposed to represent a young girl to whom Raphael had attached himself soon after his arrival in Rome, but this appears very doubtful; Passavant supposes it to represent Beatrice Pio, a celebrated improvisatrice of that time. Besides these we have seventeen architectural designs for buildings, public and private, and several designs for sculpture, ornaments, &c. It is not any single production of his hand, however rarely beautiful, nor his superiority in any particular department of art, it is the number and the variety of his creations, the union of inexhaustible fertility of imagination with excellence of every kind—faculties never combined in the same degree in any artist before or since, which have placed Raphael at the head of his profession, and have rendered him the wonder and delight of all ages.

In our next essay we shall give an account of some of Raphael's most famous scholars.

BOTTLE-PAPERS AT SEA.

THERE is a very curious bit of bye-play, if we may use such a term, sometimes adopted by sea-faring men for detecting the force of winds and currents when unable to make direct observations. Every one know that a bottle, if empty and well corked, will swim in water; and that any light article may be put into it without making it so heavy as to sink. Naval officers, when out at sea, avail themselves of this fact to make indirect observations; the empty bottle becomes in their hands a scientific instrument. They write on a piece of paper a few particulars, such as the name of the ship, the date of the month and year, the latitude and longitude of the spot where the ship may happen to be at the time, and sometimes the name of some person into whose hands they may wish the paper to be placed, if ever the means of doing so should arrive. This paper is put into an empty bottle, the bottle is sealed, and this curious messenger is cast into the sea, there to be left to the mercy of the winds and currents. The ship proceeds on her way, and the bottle floats along, urged by one or other of three forces—winds, currents, and tides. It may chance that another ship or boat may pass so near to the floating bottle as to enable the seamen to pick it up; but in most cases the bottle floats onward until it reaches some shore, where it terminates its journey. It may get into the hands of ignorant or careless people, who cannot appreciate the motive which led to its being cast into the sea; it may reach those who have no means of forwarding it or promulgating its contents in a public manner; but if it reaches the hands of naval men, who can ascertain exactly the spot where it was picked up, there are then the means for determining the general course which the bottle had pursued on its travels, and the length of time which the journey had lasted. Of course there are many casualties to which such a floating messenger is subject, which would render caution necessary in drawing any general inferences from individual cases; but if a great many be thus collected, valuable information may, and indeed must result.

It is said to have been about the commencement of the present century that this system was adopted, more from individual curiosity than from combined observation; indeed, it has not yet become a system, properly so called, for there are only here and there instances in which naval officers have thought it worth their trouble to act upon it. Accounts meet the eye in some one or other of the public journals from time to time, of bottles having been "picked up," containing information respecting the position and course of a particular

vessel at a particular time; but as these are wholly accidental, and as there is no authorised record for such documents, the whole stock of information on the matter is very vague. In 1843, however, the 'Nautical Magazine' commenced an arrangement which, if carried out by the united agreement of naval men, would give something like an appreciable value to these bottle-papers. In the volume for that year is given a "bottle-chart" of the Atlantic Ocean, containing a chart of this ocean laid down on Mercator's Projections, with the courses followed by all the floating-bottles of which correct information had been obtained. This chart is a very curious and interesting production, laid down by Commander Becher. There is one spot to indicate where the bottle was thrown into the sea, another to show where it was picked up, and a line joining the two spots. This line is simply to assist the eye in connecting the two points, and does not profess to be the course followed by the bottle; for of that course there is no visible evidence: indeed, the straight line joining the two points often goes completely across a large island or peninsula, thereby showing that the bottle must have followed a tortuous course.

On the chart are give the arrival and departure points, or the points of immersion and emersion, or the beginning and the end of the journey, of one hundred and nineteen bottles, the information respecting which had been collected from various quarters and at various times. Being thus recorded, they will remain positive and ascertained facts, like the passage of a comet at a particular time, to be used at some future time as materials whence to draw conclusions more or less valuable respecting the currents of the ocean. It may be, and no doubt often is so, that the bottle lies on the shore of an exposed coast unheeded for a long time after its settlement there, and therefore any conjectures as to the time it might have been out at sea could be of little value; but it might not be of less value in respect to the indication given by it of the direction of a prevailing current.

The distance traversed by the bottle is sometimes enormous, and the course which it must have followed is often curiously tortuous. On the chart there is one which was cast in the sea on the western coast of Africa, and was picked up near Boulogne. Another, from near the same spot, was found at Trinidad in the West Indies. A considerable number, thrown into the sea near the Cape de Verd Islands, were picked up on the shores of one or other of the West India Islands, thereby indicating a general tendency of currents in that direction; while, as a proof that some disturbing cause must have interfered with this general course, one of the bottles was found nearly due north of its place of departure. A very large number of bottles, thrown into the sea in the line of passage between England and the United States, have been picked up on the shores of Cornwall and Devonshire, and still more on the western coast of Ireland. Some of the bottles travel several thousand miles before they reach a resting place; for example, one which was thrown into the sea near Jamaica was picked up near Wexford in Ireland; another from Cuba reached nearly to Corunna; one from Greenland reached the Orkney Islands; and two others from near the same country were picked up on the north-west coast of Ireland.

The chart is accompanied by a table, giving the chief particulars of each case; such as the name of the ship, the signature of the person who cast the bottle into the sea, the date, the latitude and longitude, the place where and the time when the bottle was picked up, and the interval which has elapsed between the immersion and the finding of the bottle. This interval is, as may be supposed, very varying in length. In one case a bottle was picked up five days after it had been immersed; but more frequently two or three months passed over: in many cases two, three, or four years; in three instances, more than ten years; in another, fourteen; and in another, a bottle cast from the Blonde on the 23rd of September, 1826, about midway between England and New York, was picked up off the coast of France on the 15th of June, 1842, an interval of nearly sixteen years. In the last mentioned case it is reasonable to infer that the bottle had lain for years unnoticed on the coast.

The publication of this chart in the 'Nautical Magazine' gave rise to a very lively correspondence, and to the placing upon record of a constant accession to the number of "bottle-papers." One surgeon, a passenger in a ship to India, stated that he threw one sealed bottle overboard every day, each bottle containing the requisite particulars as to the position of the ship, the date, &c. Sometimes the bottles pass through a good many hands before their contents become available for the object in view. Thus the commander of the Chanticleer threw a bottle overboard on May 3, 1831; it was picked up by a peasant on the coast of Spain on September 12; he did not know what it meant, and kept it for two months, till it came to the hands of a more intelligent Spaniard, who sent it to the English consul at Corunna, by whom it was forwarded to the Secretary of the Admiralty. In another instance the officers of H.M.S. Benbow threw a bottle overboard in May, 1842, which was picked up on the French coast in July following, then transmitted to Admiral Duperré, the Minister of Marine, and by his orders sent to the Board of Admiralty in London. Some of the letters enter into various particulars, while others are brief enough—such as the following: "This was thrown overboard with the view of ascertaining the current. Moderate breezes from northward; fine weather. All well up to the present."—"Whoever finds this will be so good as to put an announcement into the English newspapers to that effect. The passengers on board are all well." Such brief sentences as these are superadded to the names, dates, positions, &c. There is a friendly feeling between the officers of different countries in respect to these transmissions of the migratory document. A bottle was thrown into the sea by Mr. Charles Blundy, while on a voyage to St. Michael's: it contained the following note: "Monday, 2nd of February, 1830, at 3 P.M., on board the Lady Louisa, Captain Pallant, bound to St Michael's: longitude 13° 45′ west meridian of London; latitude 45° north. All well on board. N.B. It is particularly requested that the following information may be transmitted to Mr. Robert Blundy, Woolwich, Kent, viz. the exact time and place where this bottle was picked up." The bottle was found on the coast of France, near Bayonne, on the 14th of October following; and the Minister of Marine ordered that the desired information should be sent as notified in the letter.

In the succession of papers to which the chart and table in the 'Nautical Magazine' gave rise, different opinions were expressed as to the ultimate value of such memorials. Sir John Ross communicated a few details, with the intention of showing that great caution ought to be used in drawing inferences as to the course and strength of currents from the course which the bottles seem to take. He says: "When I commanded H.M.S. Briseis, in winter 1813, I anchored two miles off Dover at the beginning of a flood to stop tide, being bound to my station off Dungeness; the wind, which was south-west, increased to a gale, which obliged me to veer to two cables: determined to ride out the gale until the strong spring-tide of ebb made, which would enable me to weigh and turn to windward under close-reefed topsails, when the ship was tending to the weather tide, I threw a bottle overboard, expect-

ing of course that it would float to windward with the current. But the sea or swell having increased with the weather tide, I saw the bottle on every wave rolling to leeward, and taking the direction of the Downs, denoted that of the wind instead of the tide, which was going two knots by the log. This accidental circumstance, and subsequent reports of bottles having been thrown overboard to ascertain the direction of currents in the ocean, induced me to make experiments on the actual drift of a bottle thrown into the sea, under various circumstances. I shaped a flat piece of wood, exactly the length and diameter of a bottle, through the centre of which was a cross-piece one inch thick, and also the diameter of the bottle; this being loaded with lead (so that the neck part only was visible when immersed), was thrown overboard in 1815, from the Actæon, which I then commanded, and at the same time a bottle, in a gale of westerly wind. When it was immediately manifest that the bottle was drifting with the wind, while the immersed wood of the same dimensions remained comparatively fixed."

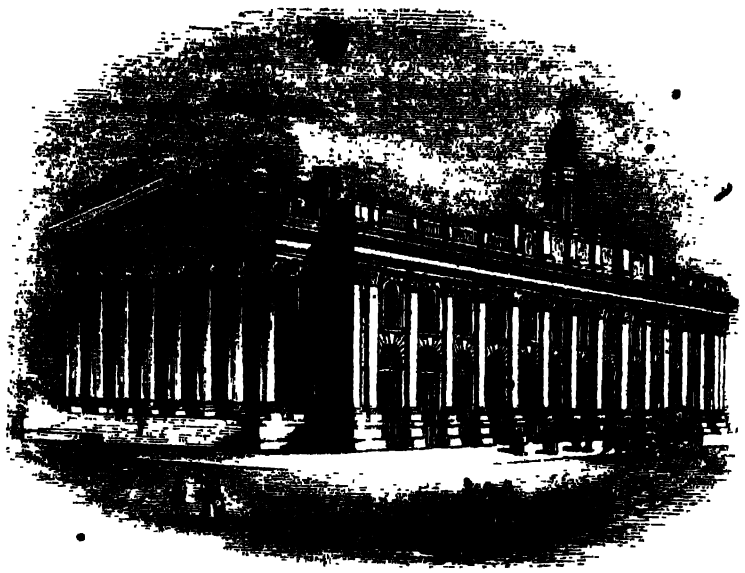
The technical terms used in the above description render it rather difficult for a landsman to understand; but the object is to show that a floating bottle is influenced in its movements by winds as well as by currents. But this has never been disputed, and it is not asserted by any one that the motion of the bottle indicates exactly and directly the course of a current. All that is expected is this, that as there are two moving causes, and as the motion of the bottle is the practical result of both, it may furnish an approximation to something like the value of each one separately; and most of the naval officers who have written on the subject seem to think that a large collection of such observations will lead ultimately to such results. Mr. Walker, in a letter to the 'Nautical Magazine,' remarked, "Let therefore the bottle experiments go on; for if they only show the general direction of the *wind*, we should gain something, let the author of the 'bottle-chart' continue to print off the track of new arrivals, to obtain a sufficient number of cases for the purpose of finally showing the *curve* which in all probability each bottle took, between the point where it was thrown overboard and the place where it was picked up, and we may then reason upon the possibility of these curvilinear voyages being made without the aid of oceanic currents."

Captain Fishbourne has suggested that the bottles should be made white by the introduction of oxide of arsenic into the liquid glass of which they are made, in order that they may more readily be seen out at sea; and he also suggests that when a bottle is picked up at sea, it should be opened and the paper read, and another paper inserted with it, stating the particulars of the finding; after which the bottle is to be again sealed and thrown into the sea at once. If this were done three or four times, three or four points in the track of the bottle would be known, and a rough approximation to its curve of movement laid down.

The Arabian Wasp-Dance.—When about to commence the Oriental ballet, the Almé exchanges this for a yet lighter dress, throws off her slippers, and advances to the centre of the room with a slow step and undulating form, that keep accurate time to the music of the reed-pipe and the castanets on which she is accompanied by her attendants; she then, after a glance round upon her audience, throws herself at once and entirely into the part she intends to act, be it pensive, gay, or tragic, she seems to know no feeling but that of the passion she represents. In some cases, a whole romance is acted; an Arab girl, for instance: she listens at the door of her tent for the sound of her lover's horse, she chides his delay; he comes, she expresses her delight; he sinks to sleep, she watches over and dances round him; he departs, she is overwhelmed with grief. Generally the representation is more simple; the "Wasp Dance" is a favourite ballet of the latter class: the actress is standing musing in a pensive posture, when a wasp is supposed to fly into her bosom—her girdle—all about her; the music becomes rapid; she flies about in terror, darting her hand in pursuit of the insect, till she finds it was all a mistake; then, smiling, she expresses her pleasure and her relief in a dance.—*The Crescent and the Cross, by Eliot Warburton.*

Respect paid to Women and Children in Hindostan.—Our tents were pitched upon a green-sward on one bank of a small stream running into the Nerbudda close by, while the multitude occupied the other bank. At night all the tents and booths are illuminated, and the scene is hardly less animating by night than by day: but what strikes a European most is the entire absence of all tumult and disorder at such places. He not only sees no disturbance, but feels assured that there will be none; and leaves his wife and children in the midst of a crowd of a hundred thousand persons all strangers to them, and all speaking a language and following a religion different from theirs, while he goes off the whole day hunting and shooting in the distant jungles, without the slightest feeling of apprehension for their safety or comfort. It is a singular fact, which I know to be true, that during the great mutiny of our Native troops at Barrackpore in 1824, the chief leaders bound themselves by a solemn oath not to suffer any European lady or child to be injured or molested, happen what might to them in the collision with their officers and the Government. My friend Captain Reid, one of the General Staff, used to allow his children, five in number, to go into the lines and play with the soldiers of the mutinous regiments up to the very day when the artillery opened upon them; and of above thirty European ladies then at the station, not one thought of leaving the place till they heard the guns. Mrs. Colonel Faithful, with her daughter and another young lady who had both just arrived from England, went lately all the way from Calcutta to Lodheana on the banks of the Hyphasis, a distance of more than twelve hundred miles, in their palankeens with relays of bearers, and without even a servant to attend them. They were travelling night and day for fourteen days without the slightest apprehension of injury or of insult. Cases of ladies travelling in the same manner by dâk immediately after their arrival from England to all parts of the country occur every day, and I know of no instance of injury or insult sustained by them.—*Lieut.-Col. Sleeman's Rambles and Recollections.*

Preservation of Food.—Whilst, in former times, during long voyages, mariners were confined to salt and smoked meats, which, in the long run, always proved injurious to health, and thousands of human beings lost their lives for the want of fresh aliments, which were even more essential in sickness, these dangers and discomforts become more and more rare at the present day. This is certainly one of the most important contributions to the practical benefit of mankind ever made by science, and for this we are indebted to Gay-Lussac. At Leith, in the neighbourhood of Edinburgh, at Aberdeen, at Bordeaux, Marseilles, and in many parts of Germany, establishments of enormous magnitude exist, in which soup, vegetables, animal substances, and viands of every description are prepared and sent to the greatest distances. The prepared aliments are enclosed in canisters of tinned iron plate, the covers are soldered air-tight, and the canisters exposed to the temperature of boiling water. When this degree of heat has penetrated to the centre of the contents, which it requires about three or four hours to accomplish, the aliments have acquired a stability which one may almost say is eternal. When the canister is opened after the lapse of several years, the contents appear just as if they were recently enclosed. The colour, taste, and smell of the meat are completely unaltered. This valuable method of preparing food has been adopted by many persons in my neighbourhood and other parts of Germany, and has enabled our housewives to adorn their tables with green vegetables in the midst of winter, and with dishes at all times which otherwise could be obtained only at particular seasons. This method of preserving food will become of the greatest importance in provisioning fortresses, since the loss incurred in selling off old stores, and replacing them by new, especially with respect to meat, ham, &c., is far more considerable than the value of the tin canisters, which, moreover, may be repeatedly employed, after being carefully cleansed.—*Liebig's Letter on Chemistry (Second Series).*



[Royal Exchange.]

PUBLIC IMPROVEMENTS, 1844.

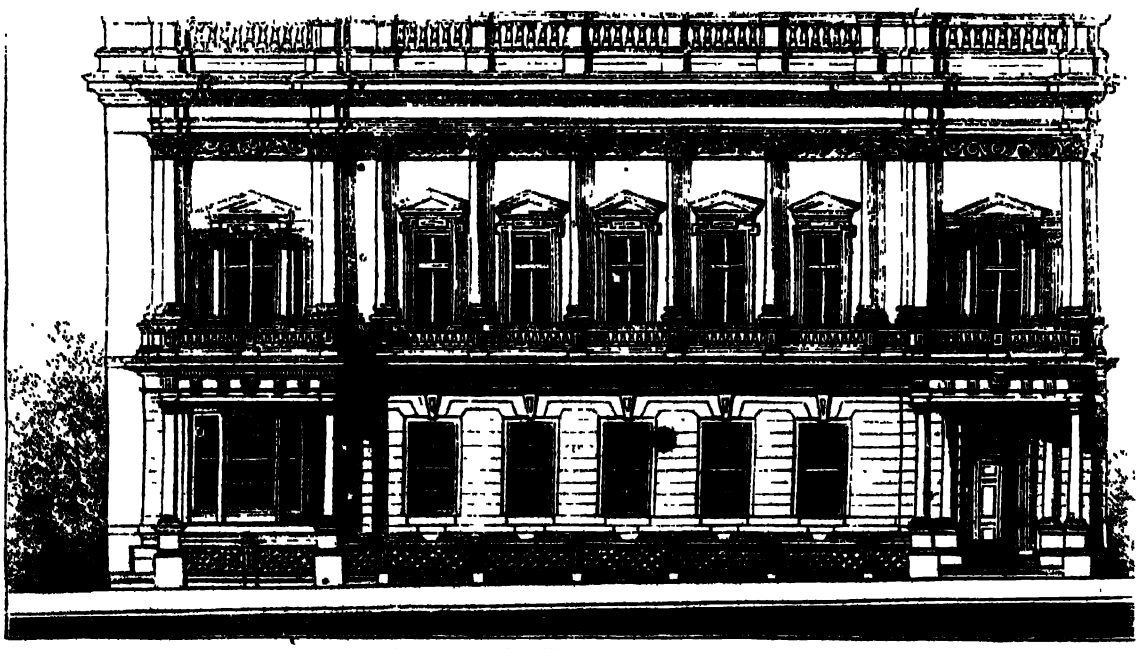
The Royal Exchange is the most important edifice which has been completed in London during the present year. We have noticed its progress and plan in previous volumes, and may now say that, taken in its *ensemble*, it is an honour to the city—one of the noblest 'monuments' in the metropolis, and one that places Mr. Tite, its architect, among the highest in his profession. The portico is now the finest thing of the kind in the metropolis—the most dignified as to its scale, and the most commanding in effect. Indeed, as far as that feature of the building is concerned, it is a more fortunate circumstance than not that the west front is narrower than the east one, because now, instead of looking planted against a line of façade behind it, the portico forms, together with the mass which serves as a background to it, a beautiful composition. The sculpture in the pediment is certainly not without its value in the general design, inasmuch as it contributes to richness, and so far to keeping; but besides that the figures look somewhat diminutive, there is not that degree of bold relief which marks some of the ornamental sculptures of the other façades. In regard to the inner quadrangle, or Merchants' Area, there has been a decided improvement upon the first design, in the substitution of arcades with attached columns against their piers, in lieu of open colonnades beneath an upper story (of the Ionic order) that would have appeared too ponderous in comparison with what supported it. With regard to the profuse decoration in encaustic painting (executed by Sang, a German artist, and his assistants), within the ambulatories, it is splendid novelty in this country, a species of embellishment utterly unknown to any other of our public buildings, and confers upon this a degree of artistic sumptuousness very far exceeding what was at first thought of, or proposed for it. With regard to the rest of the interior, it may be said generally, that the rooms and offices are adapted with much skill to the purposes for which they are intended. In the area to the west of the Exchange a fine equestrian statue of the Duke of Wellington, designed by Chantrey, has been erected.

Of the other great public buildings, the Palace of Westminster, little more can be said than that it is progressing, with the addition to the plan of another tower, of a totally different character to the original one, the Victoria tower, which will form a striking feature of the edifice when completed. Nor can more be said of the British Museum; though much work has been done, the design is not yet sufficiently developed either to enable us to describe or to judge of its merit.

The Conservative Club-house, in St. James's-street, is one of the most striking and richest pieces of architecture that has for some time been executed in the metropolis. Owing to the situation, no more is seen of the exterior than the east side or façade, for although there is a street on the north, it is little more than a lane, and hardly used at all as a public thoroughfare, on which account architectural design and regularity are not attended to on that side of the building, except for a 'return' of about forty-five feet as far as the break shown in the plan; whereby, instead of the design being abruptly broken off, a suitable degree of continuousness is kept up when the north-east angle of the building is looked at. Although upon too small a scale to exhibit the more delicate beauties of detail, the wood-cut elevation gives a distinct idea of the composition and character of the façade, which is treated more after the Palladian manner than those of the Pall-Mall club-houses, inasmuch as it consists of an order raised upon a ground-floor basement. The basement, however, must be allowed to possess two decidedly novel features, viz.—the recessed compartment at each end, that to the north forming the entrance loggia or porch, the other containing a curved bay-window, as will be understood by referring to the ground-floor plan. These portions of the basement are distinguished by Doric columns and entablatures, which are not only confined to, but proportioned to, them alone, without reference to the upper order: owing to which the columns look small in comparison with the pilasters of the upper floor, more especially as the latter are grouped together so as to form massive piers, wherein strength and solidity are combined with picturesque richness. But although not favourable to the effect of the smaller columns below, those grouped pilasters—notwithstanding that some will deem them an architectural license—are eminently favourable to the general effect of the order they belong to. The

mode in which they are applied sufficiently justifies what in other cases might be improper, because here these compound pilasters give more than ordinary importance and decided expression to the end compartments of the design, whose angles they fortify, and to which they serve as a bold and broad architectural framing. The whole of this upper part of the elevation and its order is admirably well adjusted and well proportioned—that is, the parts are well proportioned to each other, so as to preserve their respective and relative value. We have no other example of the kind, in which the character of a colonnaded front is kept up in anything like the same degree. The intercolumniation is hardly more open than what is sometimes deemed admissible where insulated columns are employed, the intercolumns being rather more than two squares and a half, or, measured from the bottom of the pedestals, three squares in height. Owing to this, and to there being only a single range of windows, there is a considerable space left above the windows, which, while it gives breadth and repose of surface, instead of being left a mere blank, is made to contribute to the general decoration. In this façade we behold not only a Corinthian order, but Corinthian quality; and the beauty of its material (Caen stone) and workmanship enhances its other merits and its truly palatial look. The interior is planned with great skill and effect. The hall, vestibule, and staircase are to be decorated in encaustic painting by Mr. Sang, and the apartments, both on the ground and upper floor, are imposing for their spaciousness, and also have an air of sumptuousness, arising from their architectural decorations, rich cornices and ceilings, and columns and pilasters, as well as from costly fittings-up and furniture.

The remaining metropolitan improvements may be briefly stated. The space at Charing Cross, called Trafalgar-square, has been thrown open to the public It [illegible], we must confess, disappointed us, since it falls short of what previous description led us to expect. One thing there is particularly offensive to our eyes as greatly impairing architectural effect, which is, that the parapet or boundary walls along the sides, instead of being carried horizontally, and parallel to the level pavement of the enclosed area, follow the slope of the external ground, just as a hedge would do.—The new office of the Amicable Assurance Society is an architectural improvement to Fleet-street—one that may probably lead to others in the same neighbourhood. Though but of moderate size, it forms upon the whole a handsome stone façade of five windows in breadth (divided into three for the centre and one in each of the slightly projecting breaks at the ends), but the cornice looks, if not too rich, too heavy for the rest of the building. The Gresham Club-house, in King William-street, is a fair piece of Italian design, and would have been an ornament to the street, had it not been thrust into a mere corner.—The new buildings in Threadneedle-street form a handsome range of street architecture, somewhat plain as to style, but by no means of an impoverished character.—How far the lines of new streets which are now in the course of formation from Oxford-street into Holborn, and from Leicester-square, through Long Acre and Holborn, to Great Russell-street, Bloomsbury, will conduce to architectural beauty in that quarter of the town, remains to be seen, scarcely any beginning having been as yet made with actual building; but we refer with much satisfaction to a recently-erected range of houses in that part of Maddox-street which runs between Bond-street and George-street, Hanover-square. It is by far the best specimen of the kind we know of



[Conservative Club House, St. James's Street.]

in the metropolis. Except the windows and the general cornice (which finishes the elevation) decoration there is none; but the parts are so well adjusted, as to the relative proportion of wall-surface to aperture, that the whole acquires an appearance of greater solidity than usual, and of unwonted nobleness. The ground-floor does not correspond with the upper part, even in regard to the proportions and disposition of the apertures, which consist of wide windows and narrow doors placed alternately, and not in the same vertical line as the upper windows. Among the subjects touched upon in this miscellaneous survey, may be introduced one well worthy of being pointed out for its intrinsic merit as a piece of interior decoration and

design: we mean the new show-room or saloon at Messrs. Williams and Sowerby's, Oxford-street. Even in the West End Club houses there are few apartments more striking in character and for the peculiarity of arrangement and effect than is this room, in which the architect, Mr. D. Mocatta, has shown much contrivance as well as fancy.

Vast undertakings are in progress, or in contemplation, at Liverpool and Birkenhead, but not yet sufficiently advanced to be noticed here. At Preston a handsome building has been erected by Mr. Welsh, in the later Tudor style, comprising three distinct portions, the Corporation Schools, the Public Library (to receive the bequest of the late Dr. Shepherd to the town), and a Literary and Philosophical Institute. Though designed at different periods in succession, the whole has been made to harmonize with great skill. The Mechanics' Institute in the same town is also by Mr. Welsh, but in a quite different style, namely, Grecian. Though of moderate size, being only sixty feet in width, it is, if of simple character, very happy in some respects, and shows more than ordinary feeling for the style, which is kept up far better than usual. In the centre is a loggia or recessed porch, a *distyle in antis* with fluted columns whose foliaged capitals resemble those of the 'Tower of the Winds,' and this order is that of the entire front, the entablature being continued throughout, and there being coupled antæ at the angles. To this loggia, which is crowned by a pediment, are attached, after the manner of wings to it, two windows (the only ones in this front), each divided into three compartments by a smaller order of antæ, over which on the blocking-courses above their entablature are four ornamental vases. These windows, which form bays internally, constitute together with the loggia a projecting mass of varied outline to which the rest serves as a background.

In Bristol, one or two buildings now going on promise to be important architectural features in that city. In the Law Courts, or Guildhall, of that city, we perceive considerable congeniality of character between this building and that by Mr. Barry at Westminster, not displayed in rivalry or imitation, but evincing the influence of that example; which is just as it should be: and it leads us to hope that, in like manner as the taste previously shown in many of our public buildings extended itself to the provinces, to the discredit of our national architecture, it may now do so to the great improvement of it. The engraving at the end of this paper gives a general idea of the details and enrichments of the design, and it will be perceived that not only is the general style the same as that of the 'New Houses,' but it is treated with the same sort of liberality. Although sculpture has not been begrudged, it is not applied to what in itself contradicts the idea of an unusual degree of embellishment: the richness of one part does not reproach the unbecoming poverty of another. Passing over those features of the façade (which is in Broad-street) that require no explanation, it will be sufficient to say that the six niches between the first-floor windows will be filled by statues executed by Mr. Thomas, an artist who is a native of Bristol, and who has been employed upon the principal sculpture in the new Houses of Parliament. These figures will represent—Edward III., the granter of the corporation charter; Queen Victoria; Dunning and Sir Michael Foster, both past Recorders of the city; and Colson and Whitson, benefactors. The shields in the coupled quatrefoil panels over windows of that floor will be sculptured with the armorial bearings of those who have been Lord High Stewards; and the other shields with those of Cabot, Penn, Camden, Southey, and other eminent men of Bristol. The principal apartments of the interior are: Law Court, Court of Requests, two Courts of Bankruptcy, and Grand Jury Room. The architect of this structure is Mr. R. S. Pope, of Bristol, for whom it cannot fail to earn deserved distinction. Another Bristol building, the Counterslip sabbath and day schools, is of the Corinthian order, but not in a very pure style. Queen Elizabeth's Hospital School, an extensive building, having a front of four hundred feet, has also been commenced in a field on the side of Brandon Hill, near Bristol; the order here also is to be Corinthian.

The lofty Gothic cross designed as a monument to Sir W. Scott at Edinburgh, has been completed, all but the statue, which it is expected will be ready to occupy its destined station on the 15th of August next, being the poet's birthday. The architect of the monument, G. M. Kemp, died on the 6th of last March, a few months before its completion. At Glasgow a bronze equestrian statue of the Duke of Wellington, by the Baron Marochetti, was inaugurated on the 27th of September last. The memorial to the late Earl of Durham is an imitation of a Greek Doric temple, but there is neither statue nor sculpture to express the purpose or record the individual whom it is intended to commemorate.

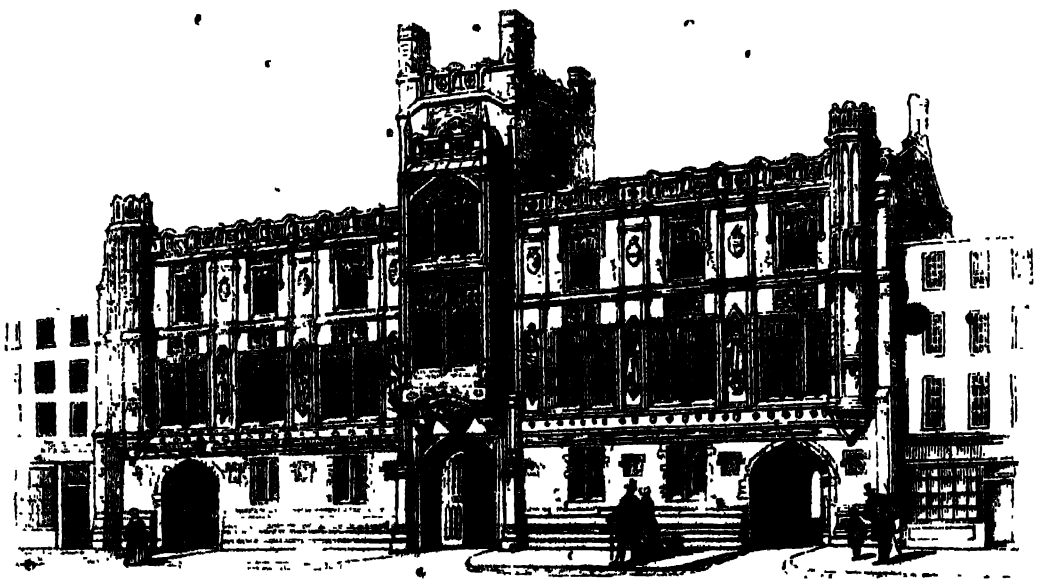
Although churches constitute the most numerous class of new buildings, they do not afford a corresponding proportion of subjects for notice here, because, while there are too many of them to allow of their being spoken of individually, it is exceedingly difficult to ascertain which among them are most deserving of attention for their architectural merits. Taking them generally there has been manifest improvement of late years. From the last report of the Commissioners for Building New Churches we learn that ten churches have been completed since the preceding report: that twenty-eight, to which the Commissioners have contributed pecuniary aid, are now in the course of building; and plans for eighteen other churches have been approved of.

The Commissioners' Reports by no means include all edifices of the kind, which is the case with regard to the following subject, whose peculiarities as well as its merits of design point it out as a more than usually interesting one of its kind, viz. the new church at Lever Bridge, in the township of Haugh, near Bolton-le-Moors. It is a highly enriched structure, in the style of Decorated English of the fourteenth century. In one respect it may be called unique for this country, since it exhibits the first instance here of a spire consisting entirely of open-work tracery, after the manner of that of Freiburg in the Breisgau, although upon a lesser scale. And not only that remarkable feature, but all the rest of the structure, its walls, as well as all the ornamental details, both internally and externally, are executed in *terra cotta*, formed of common fire-clay, and shaped in moulds expressly modelled for the purpose, under the immediate inspection of the architect (Mr. E. Sharpe of Lancaster), after his own drawings. As another specimen of ecclesiastical architecture, we proceed to notice the Chapels, Nunhead Cemetery, Peckham. The principal or consecrated chapel measures in its extreme dimensions eighty-three feet in length by thirty-nine in width. The dimensions of the smaller or dissenters' chapel are fifty-two by thirty feet. The ancient polygonal chapter-house has here furnished the leading idea for the main body of the edifice, or octagonal chapel, in which the service is read. This chapel, which is thirty-five feet in diameter, and forty high to the summit of its groining (resembling that of York chapter-house, and having rich bosses), and which is fitted up with seats after the manner of stalls, is preceded by an ante-chapel or vestibule, expanding in a cross direction

like a small transept. The other or dissenters' chapel is not only smaller — about thirty-five by twenty-five feet within—but is much more simple both in form and style. The ceiling, which rises to the height of thirty-one feet, is of wood, and in section forms a polygonal curve of seven sides, and is divided into panels by moulded ribs whose intersections are marked by ornamental bosses.

The Roman Catholic Cathedral at Nottingham, designed by A. Welby Pugin, is of the early English style, and is, professedly, a return to the ancient arrangements of a Christian temple. The sacristies, chapels, and body of the church are so arranged as to produce a picturesque group of buildings, the parts of which admirably relieve each other. The west front is divided by buttresses into three compartments, the centre one containing the principal entrance; over this door there are three deeply splayed lancet-windows. At the intersection of the nave and transepts there is a tower surmounted by an elegant spire rising to the height of one hundred and sixty-four feet. At the base of the spire, over the angles of the tower, are sculptured emblems of the four Evangelists. The interior of the edifice is remarkable for its splendour, not only as regards the architecture, but also the accessories. It consists of nave, choir, aisles, transepts, chapels, and sacristies, and is uniform in plan, one hundred and eighty feet in length, and eighty feet in width at the transepts. The principal rafters, the tie-beams, and other framing are dressed and chamfered. The surfaces between the rafters are coloured blue, enriched, in unison with the spandrils, arches, and walls, with painting and diapering. There are no galleries. The windows have been executed by an artist from Newcastle, and consist entirely of stained glass, which imparts a great degree of richness and solemnity to the whole interior. The stone pulpit is encircled with foliage and tabernacle-work, and is placed unobtrusively in conjunction with one of the great pillars between the nave and south transept. The choir is separated from the nave by a screen of open-work, called the rood-screen, which is divided into three compartments, the centre one forming a doorway, which is closed by folding gates. The rood and crucifix rise from the screen to the height of twenty-eight feet; it has likewise figures of the Virgin and St. John the Evangelist, standards for lights, &c. Within the chancel there is a range on each side of elaborately carved oaken stalls. Beyond these stalls, on the south side of the high altar, are three carved oak sedilia for the officiating high priest, deacon, and sub-deacon. The high altar is especially splendid, and consists of a single slab of stone, supported by eight shafts of Petworth marble. Beyond the high altar is the Lady-chapel, and at the sides are the chapels of St. Alkmund, St. Thomas of Canterbury, the Venerable Bede, St. Peter, and the Blessed Sacrament.

St. Bernard's Monastery, at Charnwood, Leicestershire, is, we presume, by the same architect. The style is Early English, with massive walls, buttresses, high gables and roofs, long and narrow windows, deeply recessed doorways, and the other characteristics of that kind of architecture which surpasses every other for solemnity and grandeur of effect. The chapel is cruciform in plan, and when finished will consist of a nave and choir with aisles and transepts, with a tower and spire at the intersection. The arches of the nave spring from pillars nine feet in circumference, with foliated capitals. The framing of the roof, which is decorated with painting, is open to the view, and springs from stone corbels level with the base of the clerestory windows. The high altar will be at the east end against a reredos of arched panel-work below the triple lancets of the gable. On the eastern walls of the transepts are two altars—one to the Virgin, and the other to St. Joseph. As the chapter-house adjoins the south wall of the transept, a rose-window will be erected in the gable, and three large lancets at the opposite end; the sacristy is on the south side, and forms in the plan a continuation of the transept gable wall nearly as far eastward as the termination of the chapel. The stalls for the monks will be continued a considerable portion of the way down the nave. The choir is bounded westward by a large and handsome stone rood-loft, occupying one bay of the nave. It is supported by three open arches (the side ones containing altars), and surmounted with appropriate painting and other enrichments.



New Guildhall, Bristol.

A SECOND DAY AT THE BIRMINGHAM FACTORIES.



[Wire drawing Machines.—Birmingham Wire-Works.]

In the last Supplement we had occasion to speak of several branches of Birmingham manufacture in which brass or copper, or some alloy intermediate between the two, is the material on which the skill of the operator is displayed. There are many more such, differing only in minor details of working from these; but we may pass over them, and say a few words on other matters.

Wire.

Wire-drawing, or the manufacture of wire from rods of iron, steel, or other metal, is extensively carried on at Birmingham, and is a process illustrating in a remarkable degree the ductility of metals. Unless a person has actually witnessed the operations, there is some difficulty in conceiving how the transformation takes place—how the diameter of the rod lessens and the length increases. There is no hammering or pressing or stamping, no cutting or dividing, no moulding or casting; and perhaps this is almost the only operation in the mechanical arts in which alteration of shape is produced without any one of the above agencies.

At the Wire-Works of Messrs. Carpenter and Co., to which we were favoured with access, the outline of the arrangements is such as may be here briefly described. The factory is situated in the western part of Birmingham, and consists of several buildings, of which some are occupied by wire-drawers, and the rest in a way afterwards to be noticed. There is considerable power required in the transformation of the iron rods into wire, and to provide this force there is a steam-engine employed. The other apparatus will come for notice as we proceed.

As nearly all wire is made pretty much in the same manner, it will suffice to confine our attention to that made of iron. The iron is brought to the Works in coils of rods, wrought to the state of what may perhaps be termed thick wire. In the Supplement for February, while describing the operations at a large Iron-Work, we explained how iron is brought into the form of rods and bars, by being drawn between two heavy revolving rollers while in a white-hot state. For wire-work this drawing is conducted to a greater extent than for most other purposes, until the lengthened rod is thin enough to be twisted up into a coil, and in that state to be transferred to the wire-factories.

The iron is covered with scale (the hard oxide produced by the heat necessary to roll the rods) when it comes to the Works; and to remove this scale the coils are put into large revolving cylinders containing gravel and water, the friction against which effects the desired object. From these vessels the coils are taken to a large shop or room where the whole apparatus is contained for reducing the thickness of the metal. Previously to describing these, it may be well to notice the successive steps whereby the present system has been brought about.

Narrow filaments of metal have probably been employed for various purposes from very early times; but Beckmann supposes that, in the first instance, the metal was beaten with a hammer into thin plates or leaves, that these leaves were afterwards divided into

small slips by a pair of shears or some similar instrument, and that the slips were hammered and filed to a tolerably round form. Respecting the subsequent change in the mode of operation Beckmann says, "As long as the work was prepared by the hammer, the artists at Nuremberg were called *wire-smiths*; but after the invention of the drawing-iron they were called *wire-drawers* and *wire-millers*. (*Drahtzieher* and *Drahtmühler*). Both these appellations occur in the history of Augsburg so early as the year 1351, and in that of Nuremberg in 1360; so that, according to the best information I have been able to obtain, I must class the invention of the drawing-iron, or proper wire-drawing, among those of the fourteenth century." As respects our own country, it is supposed that all wire was made by the hammer till about 1565, when some German wire-drawers introduced an improved method. Even after the improved plan of drawing the wire was adopted, the preparatory processes were still very defective, for the iron rods were brought to the requisite thickness by means of the hammer. To this succeeded a plan by which the rods were drawn through a hole by sudden jerks, thereby reducing the thickness and increasing the length. Lastly came the improvement of passing the red-hot rods between grooved rollers, until such a thickness is attained as to be fit for the wire-drawer's operations; and in this state the art remains at present.

In the room of the factory to which our attention is now directed, and of which a sketch is given in the frontispiece, there is a double range of benches, on which are a number of wheels or drums rotating on vertical axes. All these axes are placed in connexion with the machinery of the steam-engine, and are so adjusted that the drums may be made to rotate or to remain stationary at pleasure. Near each drum is placed a 'drawing-plate,' pierced with holes for the reception of the wire. The plates are made of very hard steel, and have holes punched carefully through them. These holes have all intermediate diameters, between those corresponding with the thickest and the thinnest kinds of wire; and, as the plates are easily removed from the stand in which they rest, there are the means for employing draw-plates of any required kind.

The principle of wire-drawing consists in forcing the rod of metal to pass through a hole rather smaller than itself. This could not be done unless the metal possessed a yielding quality, for a portion of the diameter must be squeezed out of its place, and made to elongate the piece. The draw-plates, then, have the holes through which the metal is to be forced, and the drums give the necessary drawing-power. One end of a coil of wire is hammered or filed thinner, and inserted into one of the holes of a draw-plate, and after being pulled through it is held tight by an instrument attached to the drum; the drum is made to rotate rapidly, and in so doing draws the metal through the hole, and causes it to wind round the drum itself, the diameter of the wire being a little decreased by this agency. It is then passed similarly through a second hole somewhat smaller than the first, by exactly similar means, whereby a second stage of attenuation is brought about. Step by step does this continue, different draw-plates and different drums being employed, until the iron is brought to any required degree of fineness. It is by very small degrees that these changes are produced; for if an attempt were made to draw the wire through a hole much smaller than itself, it would break. There is a gauge employed, to determine the size of the wire; and the size so determined is indicated by numbers: for instance, wire No. 1 is about three-tenths of an inch in diameter, while No. 26 is not above one-fiftieth of an inch. There is, however, some little diversity in this matter in different factories, even to the extent of ing with No. 1 at the smallest diameter, and upwards to the largest. It would seem as if some designation which would give the actual diameter, such as the number of hundredths of an inch, would remove all ambiguity; but doubtless those concerned have a sufficient reason for their systems.

The mere act of drawing the wire through the holes does not comprise all that is to be done; for the metal becomes so hardened by the compression, that if it were not annealed from time to time it would be too hard for working. It also requires to be roughened by the application of sulphuric acid to facilitate the process of drawing. There is a kind of iron called 'charcoal'-iron (in which charcoal has been used instead of coal in the smelting) calculated to bear more drawing without annealing than common iron; and the number of annealings therefore depends partly on the thickness of the wire and partly on the quality of the metal. The arrangements for annealing are curious: in one of the buildings of the factory are annealing-kilns, cylindrical in form, three or four feet in diameter, and eight or ten in depth; they are made of iron, encased externally with brick. The coils of wire, as taken from the drums, are laid flat one on another in these kilns; the small coils being placed within the larger ones, so as to lose as little space as possible. After every aperture is closed, a fire is kindled, and the hot air circulates round the vessel, keeping the wire—amounting to twenty or thirty cwt. at once—at a red heat for twenty-four hours; or rather, the heating and the slow cooling together occupy this space of time. In the reduction of the metal to the state of very fine wire, this annealing is repeated several times, sometimes amounting to six or eight.

According to the hardness or softness of the metal, or the tenuity required to be attained, some or other of these arrangements are more or less modified; but the general principle is the same in all. Dr. Wollaston devised a mode of making exquisitely fine wire for micrometrical purposes by the following ingenious contrivance: he made some platinum wire, so small as 1-300th of an inch diameter, by a draw-plate of his own invention; then made a tiny cylinder or mould, down the centre of which he placed the wire; then poured melted silver into this mould, so as to form a sort of little ingot enveloping the platinum; then drew this ingot into the state of a wire nearly or quite as fine as the platinum had been; then immersed the wire thus produced into hot nitric acid, by which all the silver was dissolved, leaving a central fibre of platinum smaller perhaps than human eye had ever before (or since) seen: so fine, indeed, that in some instances he produced platinum wire less than one ten-thousandth part of an inch in diameter! For some fine and delicate purposes, in which the wearing away of the draw-holes would be a detriment, it was proposed some years ago to use diamonds, sapphires, or rubies as the material for draw-plates, on account of their excessive hardness; but this costly project is somewhat too startling for manufacturers in general.

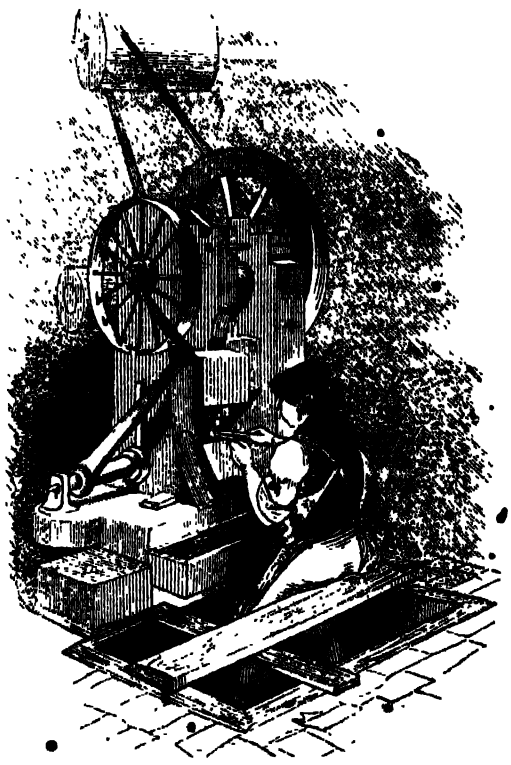
Screws.

The same factory which has here engaged our attention also furnishes the means for observing the *Screw-manufacture*, an extensive department of Birmingham industry.

A screw is, as most persons may surmise, a piece of wire (generally iron), with certain appliances at its two ends to make it serve a particular purpose. The thread or worm twisted round it prevents it from being driven into wood so readily as a nail, but, on the other hand, it retains its hold more firmly on account of the circu-

lar motion necessary for its extraction. The head of the screw answers much the same purpose as that of a nail; but the notch or cut in the head is necessary for the peculiar means whereby the screw is worked.

There are five operations here involved—the cutting of the wire to the right length, the forging of the head, the turning of the head and the upper part of the shank, the cutting of the notch, and the cutting of the thread; and these give employment to a large number of persons, chiefly females, at this factory. Several machines of rather intricate construction are used, the result of attempts to combine two or more of the processes in one. In one of these machines a coil of wire, the proper thickness for the screws about to be made, is hung on a kind of handle, and the end of the wire is inserted in a narrow opening; the machine, worked by a steam-engine, is then left to perform its own work: it draws in the wire, cuts off a small piece, presses one end in such a manner as to form the protuberant head of a screw, loosens its hold, and allows the half-made screw to fall into a box beneath. In other machines, nothing is done but cutting off the piece of wire; and each piece, thus cut, is taken up by a boy, who holds it or places it in a separate machine where one end is pressed to form a head.



[Making the Heads of Screws.]

After these preparatory stages, the pieces of wire are handed up to women, who, working at easy ranges of benches, bring the screws to a finished form. One operation is to make the notch in the head of the screw. To effect this, a woman opens with her right hand a kind of clasp or vice attached to the bench, adjusts the screw with her left hand, in such a manner that the head shall be uppermost and elevates the screw by means of a lever till it comes in contact with a small circular disc or cutter, by which a notch or groove is instantly cut in the head of the screw; she then loosens the hold, lets the screw fall into a receptacle, and adjusts another, to be treated in a similar manner.

Another set of workwomen make the thread or spiral cut round the stem of the screw. The screw is attached to a lathe which has a kind of shifting or reciprocating movement given to it; and while the screw is thus rotating and shifting, a woman applies to its surface the end of a sharp-cutting tool, shaped in accordance with the kind of thread required to be cut. The double movement to which the screw is subjected causes the cut to assume a spiral instead of a mere circular form. There is a good deal of tact required in this work, for two or three cutting tools are employed at once, one to give the requisite depth to the



[Cutting the Thread or Worm of Screws.]

cut, and another to impart the proper shape to its sloping sides. The tools have likewise to be constantly wetted with water to prevent them from becoming too rapidly heated; so that the workwomen have many little points to attend to with every screw.

A third set of females are employed in turning the head of the screws in a lathe, to give them a circular and smooth appearance. When all these various processes are finished, the screws are cleansed and brightened by being washed in alkaline water, and then dried.

The cutting of the thread to a screw, like that of the teeth to a file, is a mechanical process which has been made the subject of many attempts at improvement; but it will suffice to have given the general outline of the plan usually followed.

Nails.

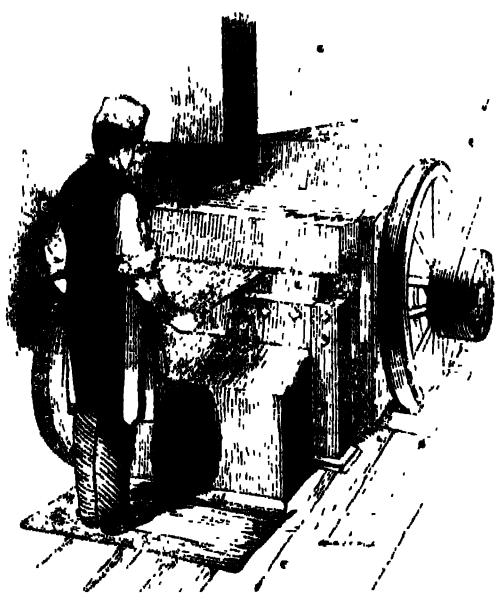
Nails form another curious branch of manufactures in this district; a branch differing from that of wire or of screws in this particular, that it partakes both of the handicraft and of the factory character. Neither wire nor screws can be profitably made without certain mechanical arrangements somewhat beyond the means of a humble workman; but millions of nails are so made.

There is one system adopted in Birmingham, and another adopted in numerous country towns and villages distant a few miles from it. In the factory arrangement in the town itself, the nails produced are generally such as are termed *cut* nails; while in the villages the kind known as *wrought* nails are made. In the former system the nails are made from sheets

of iron; in the latter they are made from small quadrangular rods. In the former a steam-engine is required to drive the machines which make the nails; in the latter the lusty arm of the workman is the only machine. The general system followed by the village 'nailers' was described in No. 606; and it will therefore suffice now to notice the factory arrangements for *cut* nails.

In the north-east part of Birmingham there is a large factory, known as the "Britannia Works," where an entire range of extensive buildings is wholly devoted to this purpose. These stories or ranges of rooms, one over another, are filled with nail-making machines, nearly a hundred in number, all of complicated construction, and all set in motion by one steam-engine. So large and so busy do the arrangements appear, and so stunning the noise produced by all these machines, that it is difficult to bring the mind to think that the whole object in view is nothing more than the making of mere nails. But this is one of the points where *numbers* give importance, irrespective of everything else.

The general principle involved in the manufacture, is to cut up large sheets of iron into strips, and to cut up these strips into nails; subject to a few variations afterwards to be noticed. The iron is brought to the form of sheets at the rolling-mills, in the usual way. When about to be cut into strips, a man takes up one of the sheets, and holds it horizontally in or against a machine in such a manner that a descending blade in-

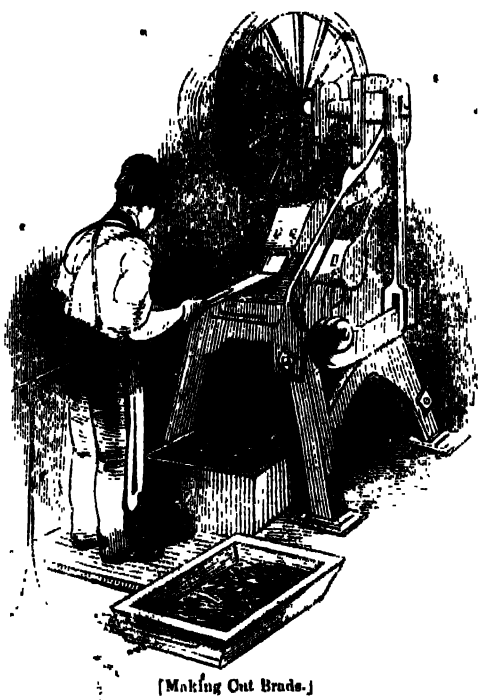


[Cutting Sheets of Iron for Nails.]

stantly severs a strip from it, the width of which is equal to the intended length of the nail. For the largest kinds of nails, this process of cutting the strips requires very forcible means.

When the strips are collected in sufficient quantity, they are cut up into the form of nails, by one or other of three kinds of machines. If we look at a common cut nail, such as those called 'brads,' we shall find that the thickness is equal from end to end, but that the width diminishes so regularly, that if several be arranged alternately with the heads in opposite directions, the whole will form one continuous piece. This is likewise the case whether the nail have a head, or have merely a blunt extremity at the thicker end. Now it is to effect this cutting without any waste that the machines are planned. In one kind of machine, for small brads, the cutter or blade vibrates up and down, cutting off a piece of iron from the strip at each descent; and it has also a swinging motion horizontally, so as to make the cuts at an acute angle with each other. The consequence of this is, that the cuts, being alternately oblique in different directions, give a wedge-shape to the pieces of iron cut off, and these pieces thereupon constitute the nails. In another form of machine the blade has not a swinging movement; but after each cut, the strip of iron is turned over, so as to present the other side uppermost for the next cut; an arrangement which brings about the same wedge-shape to the cut nail, but by different means.

The strips are held by men or boys while being cut,



[Making Cut Brads.]

and are driven onward into the machine as fast as the nails are cut off. In some of the machines, more complicated than the other, the piece of iron, after being cut off from the strip, is caught by a kind of clasp, and exposed to a pressure which gives a head to it, somewhat in the manner of heading screws. A large kind of nail called *spike* nails is made in a different manner, being produced from small quadrangular rods instead of sheets. One end of a rod being inserted in the machine, a piece long enough for a nail is cut off; and this piece is exposed to such powerful pressure as to squeeze it into the form of a nail, the tapering of form being produced neither by cutting nor by percussion. The power required for this is so great, that the rods require to be made red-hot before being cut, to make them more yielding.

All the nails, made by eighty or a hundred machines in this way, are annealed before being fitted for use; and this annealing gives employment to a distinct department of the Works. The nails are put into iron boxes, covered over, and placed in ovens, where they undergo the annealing process. This done, they are emptied into iron barrows, and wheeled to the packing-room, where they are packed in strong hempen bags, or in packages, or in casks, according to their destination.

The packing-room illustrates the vast extent to which the use of cut nails has attained; for it has sometimes contained four hundred tons of iron in the form of nails. When the machines are all in work, they cut up from thirty to forty tons of iron per week; and as there are supposed to be, one taken with another, about a million nails to a ton, this gives forty millions of nails per week, or two thousand millions in a year, as the produce of this one establishment! Supposing these nails to average one inch in length, they would extend more than thirty thousand miles in a straight line, or ten times the distance from England to New York. This is an item in the arithmetic of manufactures which brings the matter home to general readers better than when we speak of tons and hundred-weights.

Iron Tea-Trays

This is a department of manufacture which was established about a century ago in Birmingham. John Baskerville, who was first a stone-cutter and then a schoolmaster, introduced the art of making japanned iron trays; and the production became so highly approved that he made a handsome fortune, and laid the foundation for a large department of Birmingham industry.

The making of the trays is principally a species of stamping. Supposing an oblong iron tray with the corners rounded to be required: a sheet of the metal is cut to the required size, and is then exposed to repeated blows from the die or force of a stamping-press, by which the edge is gradually curled up so as to form a rim. The number of blows and the kind of die depend on the depth and pattern of the tray: and after the tray is formed, its flat portion is planished or hammered to give it a closeness and firmness of texture.

The iron trays thus produced are almost invariably japanned; but we can better notice this process in connexion with the manufacture of

Papier-maché Trays.

One of the finest and most interesting factories in Birmingham is that of Messrs. Jennens and Bettridge, where japanned papier-maché work is brought to a high degree of beauty. It is said to have been about half a century ago that the mode of making trays from paper was introduced, and from that time successive improvements have been gradually made, both in the paper foundation itself and in the finish given to the surface.

The show-room of the establishment under notice is crowded with specimens, which show how high the art of japanning has now reached. Almost every variety of household furniture, and trinkets without number, are here displayed, exhibiting the intermixture of japanning with painting and with inlaying. This art is independent of the material beneath, for whether this be of iron, wood, or paper, the subsequent processes still continue pretty much the same. The factory, however, embraces the two departments of paper-work and japan-work, and these may be noticed in succession.

There are two modes of manufacturing in paper or 'papier-maché' (literally 'chewed paper,' but implying paper reduced to fragments and softened). In these the paper is reduced to a pulpy mass, and pressed into moulds; in the other, sheets of paper are pasted together until the required thickness is attained. It is in this latter mode that tea-trays are made.

In the first place, a cast-iron mould is prepared from a model, the upper surface of the mould corresponding with the interior of the tray to be made. This mould is greased on the surface, and is then prepared to receive its successive garments of paper. The paper employed is a greyish, thick, granulated kind, made for the purpose. It is cut up to the required size and shape by women seated at tables; and the pieces thus cut are handed to the pasters. Every sheet or piece is laid down on a bench, and pasted thoroughly on both sides with a brush. Another woman takes up the pasted sheet, and lays it on the mould, adjusting it to its place; a second piece, similarly pasted on both sides, is laid on the first; and a third on the second. These three thicknesses, are then rubbed and smoothed down well with a cloth, till they follow exactly the contour of the mould; and the mould with its covering is placed in a heated stove-room, where it remains till perfectly dry. Three more thicknesses are applied in a similar way; then a second stove-drying; then three more layers; and so on, until a mass of pasteboard has been produced thick enough for the object in view. An average number of thicknesses is about thirty or forty: but for some purposes there are as many as a hundred and twenty, requiring about forty stove-dryings in the course of the manufacture, and necessarily involving a large amount of manual employment.

When the whole substance is laid on and hardened, the next step is to remove it from the mould or pattern on which it is laid. The edges are cut with a sharp knife, so as to loosen contact at those parts; and as the mould had been greased before the paper was applied, the removal of the latter is easy. When removed, it is trimmed and smoothed by various means, and then presents the exact form of the article to be made. Where it is of a more ornamental character, and made by casting, a simple process of drying and of trimming brings it to the proper state.

Then ensues the ornamental department of the work, in which taste is constantly called forth. The black polished surface, which is the groundwork of nearly all trays, is given by a black japan varnish, applied by women with a brush. A highly smooth surface is produced by rubbing with powdered pumice-stone and afterwards with finer powders, finishing with the bare hand as a rubber.

The painting is a distinct department, and is carried on with much skill. As in most other branches of art, there are manufacturers who serve the cheap as well as those which provide the good; and for three-pence or fourpence the centre of a large tray is bedizened with fine staring flowers or ornaments by a process midway between painting and stencilling. But in the kind of work which we have here under notice, the painters are really artists, competent to the production of landscapes, portraits, and other specimens of the pictorial art, the minuteness and high finish of which are made to depend on the costliness of the article produced.

Many highly curious kinds of inlaying are employed in japan-work. Formerly an imitation of tortoise-shell was much in vogue, and was thus produced:—When the tray was properly prepared, a thin transparent varnish was laid on, and leaf silver was laid upon this; the two were hardened together in a stove, and a thick body of varnish was added, capable of concealing the silver; a piece of pumice-stone was applied at spots here and there to remove so much of the varnish as should admit the silver to show slightly through, thereby giving a kind of imitative tortoise-shell appearance. For a commoner sort vermilion was used instead of silver.

Some of the finer kinds of japan-work are inlaid with mother-of-pearl in a curious manner. Pieces of this delicate substance are cut to the exact form required, and laid down upon the wet japan in their proper position; and the whole surface is then varnished and pumiced, varnished and pumiced, so many

times, that the white comes to a uniform level, and the pearl seems to be inlaid like buhl-work. Another method, for more elaborate patterns, is the following:—The pearl is applied to the surface in a large plain piece, the full size of the device; on this is sketched the exact pattern which the pearl is to present, with a paint which will resist the action of aquafortis; the other parts of the pearl are eaten away by this acid, and thus the required pattern is developed. For commoner kinds of work coloured metallic foil is used instead of pearl, often producing a variegated and pretty appearance. Sometimes japanned articles are gilt all over, previous to the application of these painting or inlaying processes; and by varying the combinations of these methods, there is great scope for the exercise of taste.

Taken altogether, this may be deemed a very pleasin branch of art, and one capable of being applied (if fashion should lead the way) to a number of purposes not yet within its range. The name of 'japan' seems to point to the Eastern origin of this art; and if we refer to the mode of making japanned ware in the Burmese Empire, described in No. 629, we shall see how far there are points of difference in the Eastern and the English modes of procedure. It may be well to state that the distinctive character of japan-work lies in the use of gum and spirit with the colouring agent; instead of oil and turpentine, as in common house-painting and floor-cloth printing; or size and water, as in paper-staining and distemper-painting.

Pins.

"Where do all the pins go to?"—This question has been asked, but it would be somewhat difficult to give a correct answer. Of the millions which are made every year most of them by degrees become 'lost,' and are thought of no more. However, it is lucky for the pin-makers that such is the case; and it may be well here to show briefly how the supply is kept up.

The pin-manufacture is not so much localised as most other branches of manufactures in metal. There are large factories in London, in Birmingham, in Warrington, and in Gloucestershire; and there seems no reason why such should not be the case elsewhere.

This curious and apparently insignificant branch of industry is, like many others, carried on under two different forms; the one by hand labour almost exclusively; and the other wholly, or nearly so, by machinery. The nature of the operations by the hand method gives a more intelligible idea of the object to be attained, than the intricate and complex arrangements of a machine: we will therefore follow the steps of the former.

In the first place the brass wire (for brass it is, however silvery it may look when finished) must be straightened from the coils in which it is brought to the works. This is done by fixing a number of pins in a board, so arranged that if wire be drawn between them it will be forced to assume a straight direction. The wire is cut off into lengths of thirty feet each, and these lengths are further cut into pieces long enough for about half-a-dozen pins. One man used to this employment can straighten twenty thousand dozen of pin-lengths in a day.

Next ensues the pointing. This is effected by applying one end of each wire in the proper position to the edge of a rapidly rotating wheel. A workman takes up twenty or thirty lengths of wire between his fingers and thumbs, ranges them in a row, brings all the ends parallel, and applies the points obliquely to the edge of a steel wheel covered with fine teeth on its surface; he gives a rotatory movement to each wire, by a peculiar action of his fingers, so that in an inconceivably short space of time all the ends are brought to a sharp point; he then applies them to the edge of a rotating gritstone, by which the points become smooth. This operation, like needle-grinding and fork-grinding, is very deleterious, from the particles of metal and of grit which float about in the air; and the same means have been contrived in various quarters to ameliorate the one as the others, subject nevertheless to that strange apathy which too often leads workmen to neglect the most ordinary precautions against disease.

The wires being pointed at both ends, they are cut up into pins. A bundle of them is arranged even and parallel, and a heavy cutting blade is made to sever them all at a particular part of their length, sufficient for one pin; the group is again adjusted, and again cut; and so on until all the pieces have been severed into pin-lengths. The middle pieces, which were not pointed in the original process, are now ranged in order between the fingers and thumbs, and applied to the wheels, where they are all pointed at one end.

Preparations are now made for putting on the 'heads' to the pins. The wire used for this purpose is thinner than that for the shaft of the pin, and is wound into a close spiral round a central wire the same thickness as the pins, by means of a small spinning-wheel. When this coil is finished, it is slipped off the central wire; and six or eight of these being taken up between the fingers of a workman, he cuts them up by means of a fixed chisel or cutter into pieces of either two or three coils each, according to the sort of pin. This operation is one wherein the eye and the fingers of the workman gradually acquire a precision and quickness quite incomprehensible to other persons. A man will cut up eighteen or twenty thousand of these heads in a day, without making a mistake as to the number of coils or turns of the spiral in each head.

When these heads have been annealed, they are fixed on the pins by women and children, a process which has been effected at different times in different ways. By the old method, one of the little coils or heads was taken upon the end of a shank, placed in a small steel die sunk to half the size of the head, and struck by another similar die let fall upon it; by which means the coil became firmly closed upon the pin and formed its head. The falling die was worked by a lever moved by the foot of the workwoman, and the pin was held horizontally. A better mode has been introduced, by which a smooth and more durable head is produced. In this method the pin is placed vertically in a hole, and the upper die falls upon it in such a manner as not only to form and fasten the head, but also to give it a smooth and round surface at the top; and when the heading is done, to obviate the loss of time in moving the pin out of the hole, there is a spring beneath which jerks it up so as to render it easily seized by the fingers. One pin-header can fix from twelve to fifteen thousand in a day.

This being done, the change of colour is wrought. A great quantity of pins is put into a barrel or cylindrical vessel, together with cream of tartar and warm water; and by the rotation of the barrel, and the friction one against another, they become perfectly clean. They are next laid in a copper pan; above them a layer of grain tin, then another layer of pins, and so on alternately till the vessel is full; a little water and cream of tartar are also introduced, and the whole is allowed to boil for an hour. This process is repeated two or three times, by which the surface of the pins becomes completely coated with a thin layer of metallic tin. The pins are washed in water, separated from the grains of tin by straining, dried in hot bran, and cleansed from the hot bran by winnowing.

Lastly, comes the 'papering,' a process which (rather unnecessarily, it would appear) divides the pins into

pennyworths or smaller quantities. The pieces of paper have grooves or channels impressed on them, by means of a sort of crimping-irons, and the pins being taken up by a kind of comb which places all the points in one direction, are pushed quickly through or into the paper, a small lever being employed to facilitate this process. The children by whom this is done acquire so much expertness in the art, as to be able to paper thirty or forty thousand in a day.

It will thus be seen that the number of distinct operations is very great; and yet so much has the subdivision of labour effected, that three or four thousand [illegible] sold for a shilling. It is not at all inconsistent with experience in other subjects that the desire to concentrate the manufacture under mechanical agency should have led to the invention of machines having this object in view. So far back as twenty years ago a machine was patented by which the whole chain of operations was carried on without the aid of manual labour; the wire was drawn off a reel by a pair of pincers, straightened in its passage between a row of pins, cut off to the proper length by a sharp tool, pointed at one wheel and smoothed at another, and lastly headed. Another large establishment, slightly noticed in No. 113, has been devoted to the production of solid-headed pins, in which the head is formed out of a portion of the shank itself, pressed into a globular form.

Ten or a dozen years ago it was stated that twenty millions of pins are required for the consumption of the kingdom *every day!*

Steel Pens.

Steel pens, like pins, are articles so small in size that it is somewhat difficult to bring the mind to estimate them by the ton weight: yet such must be done in viewing them as a branch of manufacture. London has the credit of producing the best pens, or at any rate the highest price is charged for them; but Birmingham is the main seat of the manufacture in respect to quantity. Its manufacturers talk of the millions of dozens which they produce every year; and there can be no doubt, from the large extent of some of the factories, the number made must be enormous.

Every firm has its own peculiar mode of making these little steel implements, differing from that of others in a degree which, though inappreciable by most persons, is important in the eyes of those engaged in the manufacture. Long before the introduction of steel pens as a general article of sale, metallic pens of some kind or other were often made; sometimes silver, when intended for presents; sometimes brass, when intended to accompany cheap brass inkstands that used to be made some years ago. One of the first attempts to combine the elasticity of steel pens with an increased degree of durability, consisted in arming the points with metallic nibs; but the improvement was not adequate to the increased cost. Another class of improvements, or suggested improvements, was the introduction of pens whose nibs should be formed of precious stones, or some other substance of great hardness. One kind, patented twenty years ago, consisted of a tortoiseshell tube or barrel, with small pieces of diamond or ruby imbedded in the nibs. Another kind contained a nib of ruby set in fine gold; and such pens have been said to last six years without injury. A third kind is formed of rhodium nibs set in fine gold. Other varieties have been occasionally brought forward; and at the present day there are small pens to be seen in some of the London shop-windows, marked a guinea each.

But it is the great commercial element of cheapness which gives a character to the manufacture. The millions, and not the units, determine the general arrangements of the whole. A small workshop will suffice for the making of a guinea pen; but a large factory is required for the production of those sold at ten or twenty for a penny. It was not until the general introduction of steel as the material employed, that the matter assumed a commercial importance.

As this manufacture progressed, steel of less and less thickness became employed, so as to give an elasticity as much as possible resembling that of quill pens; and the temper of the steel became an object of especial attention. Whoever has noticed the almost infinite variety in the forms of pens, will perceive that the slits and apertures above the nib are so many contrivances to give elasticity to the pen; and indeed most of the patents have had reference to the arrangement of these incisions.

A description of one of the modes of making common steel pens will illustrate the general character of the manufacture everywhere. A punch is first made of hardened steel, the exact size and shape of the pen to be made. Very fine sheet steel, from the one-hundredth to the two-hundredth of an inch in thickness, is cut up into strips two inches and a half in width; and from these strips small pieces are cut of the proper size for the pens. These blanks are annealed, to remove the hardness which the rolling of the sheets had imparted, and are then well cleansed on the surface. Stamping-presses are then used to impress the maker's name on each blank, and to cut out the aperture, if any. A very fine cutting tool worked by a press is then used to cut the slit in the piece of metal—not entirely through, but leaving it to be finished in an after stage of the operation. The hollow or dished form is given to the blank by placing it on a concave die, and allowing a convex punch to press forcibly upon it, by which it is made to conform to the concavity of the die. The pens thus made are hardened, by being heated and then suddenly cooled: and the slit is finally perfected, or carried entirely through the thickness of the metal, by pinching the nibs in a kind of clasps or pincers.

These are the outlines of the mode employed, subject to variations in different factories. The punching-press is the chief working agent, for by its aid the cutting out of the blank, the lettering and stamping, the forming of the aperture and slit, the dishing, and other parts of the process are done. There is a curious means employed for cleaning the pens when finished or nearly finished. There is a machine employed consisting of a tin cylinder about a yard in length by eight or nine inches in diameter, having a hole in the middle of its length, furnished with a cover or door: the cylinder is hung on joints at each end to cranks formed one on each of two axles. The door is opened, several thousand pens are put into the cylinder, and the latter is made to revolve in such a manner that it shifts backwards and forwards, up and down, so as to shake the pens among each other completely, thereby cleaning them by their mutual friction.

Swords.

It may seem strange that while Sheffield is the head-quarters of the cutlery trade generally, Birmingham should have been the chief seat of the sword-manufacture in this country; yet such seems to be the fact. Perhaps it may be explained from this circumstance, that as Birmingham supplied during war-time an immense number of muskets for the use of the army, an extension of the same agency brought the sword-trade also within reach of the town.

The sword-trade of many different countries has been an object of great importance and solicitude. The possession of a good sword, especially in times and in countries where the arts of war are more cherished than those of peace, is deemed a matter of high import;

and hence the art of the maker has been exercised to find the best mode of imparting the requisite character to these instruments of destruction. Spain was at one time especially famous for her manufacture of swords: the "Toledo blade" being mentioned with high commendation in many a history and romance. On the right bank of the Tagus, not far from the city of Toledo, is still existing a royal sword-manufactory, of which the author of 'A Year in Spain' thus speaks:—"Here are made all the swords, halberds, and lances required for the royal armies. The establishment is on an admirable footing, and the weapons now made in it are said to be nowise inferior to those famous *Toledanos* which, in more chivalrous times, were the indispensable weapons of every well-appointed cavalier. Toledo was not only celebrated in the time of the Moors, but even under the Romans, for the admirable temper of its swords, which is chiefly attributed to some favourable quality in the water of the Tagus used in tempering the steel. As a proof that this is the case, the workmen told me that in the earlier period of the French invasion the manufactory was removed to Seville, where the national junta then was; but the swords manufactured on the banks of the Guadalquiver were found to be very inferior to those which the workmen had made in Toledo." If this be really so, and if Toledo blades be better than others, it would seem to be worth while to test this river-water, and see whether a similar quality could be artificially given to the tempering-liquid elsewhere.

Milan was also at one time celebrated for its sword-blades, but Damascus was the most famous place of all. Many are the marvels which have been told of the Damascus blades. There were three cities, Damascus, Cairo, and Ispahan, where highly esteemed swords were made in past times, but where none seem to be made now; so that any at present seen are relics of past times, and are very highly valued. A keenness of edge and a flexibility of substance are the chief characteristics of these blades. Stories have been told of Damascus blades being wound round within a turban, so great was their elasticity; but it is believed that much exaggeration exists in the reputed wonders of these blades. Mr. Holland states that a gentleman who had purchased a Damascus blade in the East Indies for a thousand piastres, told him that although the instrument was very flexible, and bore a very fine keen edge, it could not with safety be bent to more than 45° from the straight shape. The skill and dexterity of the swordsman appear to have had as much to do with the effects produced as the excellence of the sword itself. The Damascus blades are distinguished for a peculiar variegated pattern on the surface, the opinions concerning the mode of producing which are noticed in No. 471.

In respect to the English manufacture, M'Pherson states that on the breaking out of King William's war against France, a company of sword-cutlers was formed for making sword-blades in the county of Cumberland and the adjacent districts; but though they were enabled to purchase lands to erect mills, and to receive and employ great numbers of German artificers, yet they did not succeed. They sold their patent to a company of merchants in London, who thereupon purchased under that patent to the value of 20,000*l.* per annum of the forfeited estates in Ireland. The Irish parliament, however, knowing this estate to have been purchased at a very low rate, would not permit the company in its corporate capacity to take conveyance of lands, lest they might have proved too powerful a body in that kingdom. This obliged them to sell-off their Irish estates, which put an end to the corporation.

It is not very clearly known at what time Birmingham became the centre of the sword-trade [illegible] manufacture has for many years been one to a great extent at that place. It is conducted in the following sufficient manner:—The steel is brought to the form of a magazine called *sword moulds*, either at Sheffield or at Birmingham, these sword-moulds being [illegible] in size and shape for swords. The bars are heated and are forged into shape by two men, the 'maker' and the 'striker,' much in the same way as cutlery. When the sword is required to be hollowed at the surfaces, it is hammered between steel bosses or swages. Then ensue the processes of hardening and tempering, on which so much of the excellence of the sword depends, the hardening being effected by a sudden cooling after heating, and the tempering by a gradual cooling. As the blade has become somewhat distorted in form by these processes, it is twisted straight and regular by confining it at certain points, and forcibly bending it in the proper direction. The whole surface is then ground upon a large stone, and an edge given to it. As it loses some of its temper by this process, it is again tempered and afterwards polished. The making of the handles is a separate department of the manufacture, depending for its character on the costliness of the materials employed.

An important stage in the manufacture of every sword is the 'proof' to which it is subjected, a proof consisting of a series of tests much more violent than the sword is likely ever to undergo in practice. Mr. Inglis, while speaking of the Toledo blades, says:—"The flexibility and excellent temper of the blades are surprising. There are two trials which every blade must undergo before it is pronounced sound, the trial of flexibility and the trial of temper. In the former it is thrust against a plate in the wall, and bent into an arc at least three parts of a circle; in the second it is struck edgeways upon a leaden table with the whole force which can be given by a powerful man holding it with both hands."

In the English method, for a stout cavalry sabre, its point is placed against a pin in a board, and bent round a curve formed by six or eight other pins placed equidistant in the board, the degree of flexure being such that the middle of the sword deviates six or seven inches from a straight line drawn from heel to point. It is then pressed down with its point on a board, and bent round or back to a prescribed distance. It is lastly struck, with all the force a man can use, against a stout wooden block, the edge, the back, and both sides being struck in succession. When the sword has borne all these severe tests, it is declared fit for service, to cut and chop our fellow-men on the field of battle.

END OF VOLUME THE THIRTEENT

*** The Office of the Society for the Diffusion of Useful Knowledge is at 42, Bedford Square.
LONDON: CHARLES KNIGHT & CO., 22, LUDGATE STREET.
Printed by WILLIAM CLOWES and SONS, Stamford Street.